JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 537 Book Building, Detroit, Mich.

T. H. Ferguson, President, Lake Geneva, Wis. M. Jacob, Treasurer, Knoxville, Tenn.

Executive Board

Geo. Hilton, 1st District; E. P. Althouse, 2nd District; L. A. Merillat, 3rd District; C. A. Cary, 4th District; C. H. Stange, Chairman, 5th District; Geo. H. Hart, 6th District; R. S. MacKellar, Member-at-Large.

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Vol. LXXVII, N. S. Vol. 30 August, 1930 No. 2

AGENDA

A number of important matters will come before the members of the A. V. M. A. for action at the Los Angeles convention. Perhaps the most important of these will be the proposal to increase the annual dues. The Executive Board, up to this time, has not taken any definite action, one way or the other, on the proposed amendment, although this will undoubtedly be done at the meeting of the Board to be held the day before the opening date of the convention. The majority of our members who have expressed themselves appear to favor an increase in the dues. The important point to be decided is just how much should the dues be increased. The Executive Board will undoubtedly make a definite recommendation on the amendment. Those members of the Association who are in attendance at Los Angeles will make the final decision, unless, for some reason, it is decided to defer action until a later date.

The Executive Board has already approved the proposal to make the President a member of the Board during both his term of office and for the year immediately following his incumbency. The Association will be asked to adopt the proposed amendment. If this action is taken, Dr. Ferguson will become a member of the Board at the close of the convention, as will likewise the member elected to the presidency at Los Angeles. Thereby, with the increased personnel of the Board already provided for, the

administrative body of the Association will consist of thirteen members.

There will be a total of thirty reports to be made by the various officers, committees, representatives and delegates. This sounds like a large number and suggests the consumption of considerable time. However, some of these reports will be short and in all probability it will be possible to receive and dispose of them in a very few minutes. Others, of more importance, will require more time and attention. The election of officers is an important item of business, and it may be that we will have an opportunity to try out the new system of holding elections, something that was not necessary at Detroit last year, in the absence of any contest for any of the officers. The selection of a meeting-place for 1931 will also be in order, unless this function is delegated to the Executive Board.

On another page is given a list of the papers to be presented, as complete as possible at the time of going to the press.

Hotel Rates at Los Angeles

The Ambassador Hotel, official headquarters for the Los Angeles convention, quotes good outside rooms, with running water, at $3.00 per person, two in a room; $4.00 per person, single. For twin-bedded rooms with bath, $4.50 per person, two in a room; $4.00 per person, three in a room; or $7.00 per person, single.

Members desiring more moderately priced rooms can secure reservations at the Gaylord Hotel, across the lawn from the Ambassador, at $6.00 single and $8.00 double, or at the Windsor Apartments at $5.00 single and $7.00 double.

Clinics at Los Angeles

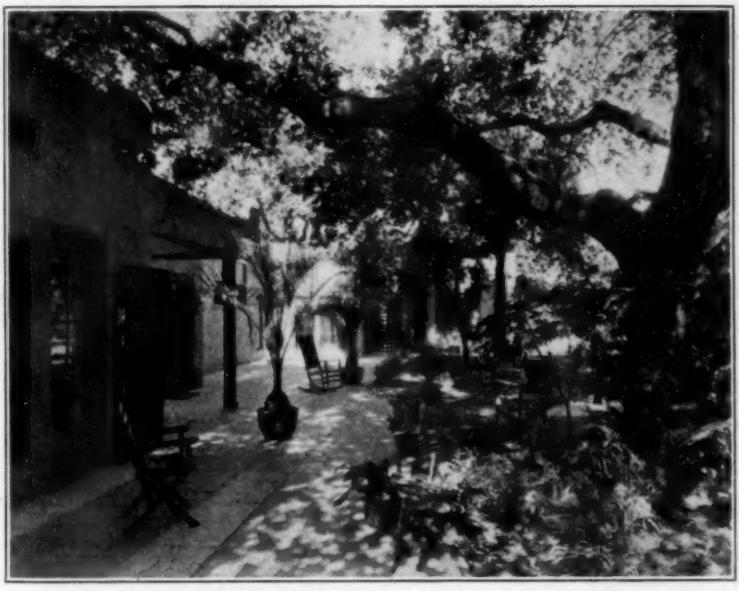
A most complete set of clinics for both large and small animals is being arranged by Dr. C. A. White, chairman of the Sub-Committee on Clinics, whose reputation in this line is well founded.

The demonstrations will be held at the Los Angeles Union Stock Yards, which now covers one of the historical spots in southern California. It was on these grounds that the battle of La Mesa (Batalla De La Mesa) was fought on January 9, 1847. Historical markers at the entrance of the stock yards grounds prove of interest to all visitors. It was here that Commodore Robert Field

Stockton, Governor and Commander-in-Chief of the American Forces in California from July 23, 1846, to January 16, 1847, recaptured Los Angeles from General Jose Maria Flores.

Buildings and space have been provided, so that all the clinics will be held on the well arranged grounds. Facilities here allow for the assembling of a large number of cases suitable for demonstrations. A real western barbecue lunch will be furnished right on the grounds.

The large stock yards, covering some thirty-five acres, with accommodations for over 3,500 cattle, 9,000 sheep and 6,000 hogs



Garden scene at one of the most beautiful and modern small-animal hospitals in the country, located at Pasadena, California.

at one time, will in itself prove of interest to the veterinarians. A system of double chutes allowing for the rapid unloading of 30 carloads of stock, a sheep dipping-vat with a moveable carrier, a vaccinating section for hogs, rodeo grounds and a sales pavilion are a few of the features that are well worth inspecting. Annual live stock shows which are held here attract exhibitors from all over the country and typical western rodeos lend color to their yearly doings.

With the clinics being held at these ideal live stock grounds, the visiting veterinarians are assured an interesting and educational program.

New Hill Memorial Library
Louisiana State University

EXECUTIVE BOARD ELECTIONS

The polls for the election of five members of the enlarged Executive Board of the A. V. M. A. were closed June 26, and the ballots counted the following day, with the following candidates declared elected, by the board of tellers:

District 5—Dr. C. P. Fitch, St. Paul, Minn.
District 7—Dr. C. H. Hays, Lincoln, Nebr.
District 8—Dr. N. F. Willaims, Fort Worth, Texas
District 9—Dr. D. H. Udall, Ithaca, N. Y.
District 10—Dr. O. V. Brumley, Columbus, Ohio

The above five members-elect will become members of the Board at the close of the meeting in Los Angeles this month. Dr. Fitch and Dr. Hays were elected for five-year terms. Dr. Williams will serve for one year, Dr. Udall for two years and Dr. Brumley for four years.

On the opposite page is a table showing the personnel of the enlarged Executive Board, the area served by each member under the redistricting, the length of the term of office of each member and the number of members in his district, revised to July 1, 1930. (See similar table published in the JOURNAL, October, 1929, page 499.)

In the five districts there were 1252 votes cast and these were fairly evenly divided between the five districts, as follows:

	MEMBERS IN DISTRICT	VOTES CAST	% OF VOTE CAST
District 5	496	272	54.8
District 7	402	217	54.0
District 8	496	287	57.9
District 9	451	235	52.1
District 10	459	241	52.5
	2304	1252	54.3

Note that only 54 per cent of the members in the five districts took the trouble to vote. Note also that the percentage of those who voted in the several districts varies only slightly from the average, District 8 making the best showing, with a vote of approximately 58 per cent.

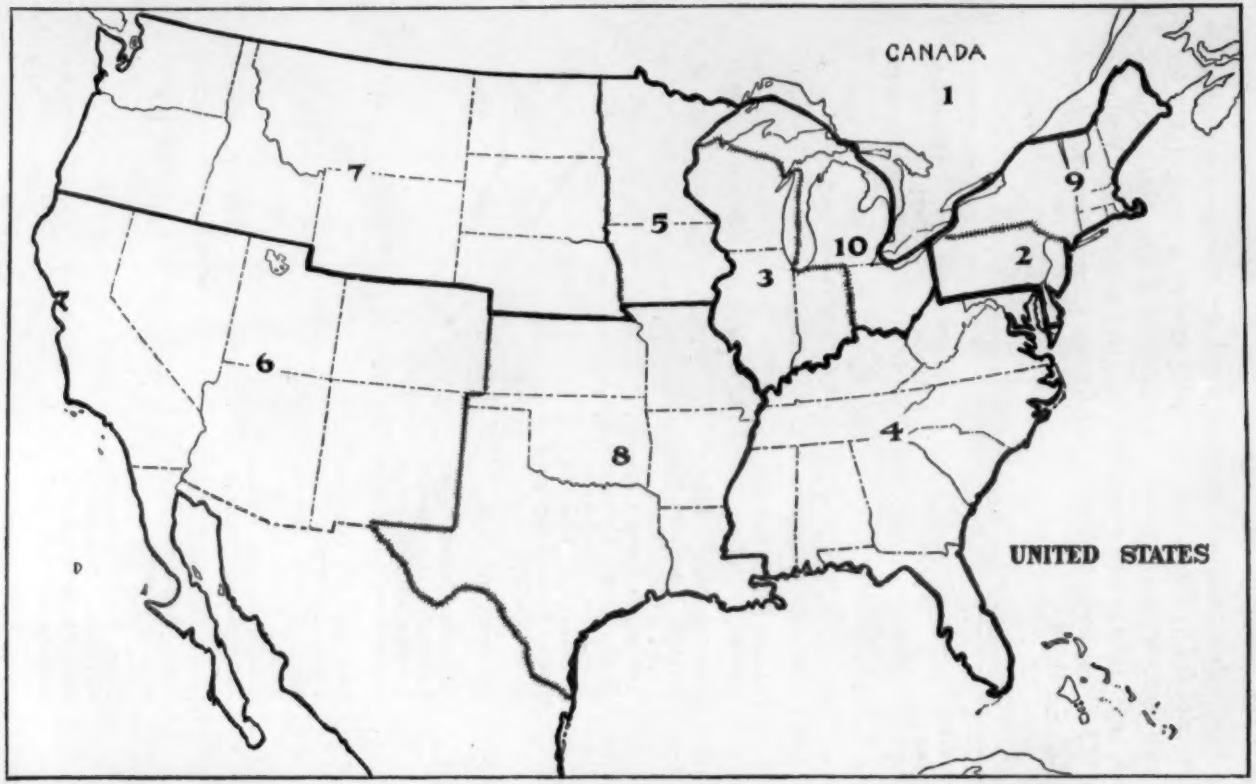
In only two districts could it be said that there was a real contest. In District 9 Dr. Udall had a lead of 9 votes over Dr. H. W. Jakeman, who in turn led Dr. Adolph Eichhorn by exactly the same margin. In District 10 Dr. Brumley had 68 votes, to

64 cast for Dr. B. J. Killham. In the three other districts the vote was rather onesided, without much semblance of a contest. In District 5 Dr. Fitch had 118 votes against a total of 112 for his two nearest competitors. In District 7 Dr. Hays had 78 votes, to 87 for his two closest rivals. In District 8 Dr. Williams had 113 votes, compared with 127 for the candidates who placed second and third.

Executive Board districts after redistricting is effected

Executive Board District	Area	Board Member	Term Expires	Members in District
1	Canada	Geo. Hilton	1932	166
2	Pennsylvania, New Jersey and Delaware	E. P. Althouse	1933	451
3	Indiana, Illinois and Wisconsin	L. A. Merillat	1933	599
4	Kentucky, West Virginia, Virginia, Maryland, District of Columbia, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Florida, Cuba, West Indies and South America	C. A. Cary	1934	486
5	Minnesota and Iowa	C. P. Fitch	1935	496
6	California, Nevada, Utah, Colorado, New Mexico, Arizona, Mexico, Central America and Canal Zone	Geo. H. Hart	1931	448
7	Washington, Oregon, Idaho, Montana, Wyoming, North Dakota, South Dakota, Nebraska, Alaska, Hawaii and Philippine Islands	C. H. Hays	1935	402
8	Kansas, Missouri, Oklahoma, Arkansas, Texas and Louisiana	N. F. Williams	1931	496
9	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and New York	D. H. Udall	1932	451
10	Ohio and Michigan	O. V. Brumley	1934	459
At-Large		R. S. MacKellar	1932	

(*See map on following page*)



EXECUTIVE BOARD DISTRICTS

Heavy solid lines show boundaries of present districts. Shaded lines show where Districts 2, 3, 5 and 6 will be divided, to form Districts 7, 8, 9 and 10, effective at the close of the Los Angeles convention.

Left—
DR. C. H. HAYS

Right—
DR. N. F. WILLIAMS

Below—
DR. D. H. UDALL

MEMBERS-ELECT OF THE A. V. M. A. EXECUTIVE BOARD 1930—

Left—
DR. O. V. BRUMLEY

Right—
DR. C. P. FITCH

Districts of present districts. Shaded lines show where Districts 2, 3, 5 and 6 will be divided, to form Districts 7, 8, 9 and 10, effective at the close of the Los Angeles convention.

PAPERS

GENERAL SESSIONS

1. The Chemist's Viewpoint of Live Stock Nostrums—Dr. J. H. Weiner, Kansas City, Mo.
2. Veterinary Problems on Fur Farms—Dr. J. E. Shillinger, Bureau of Biological Survey, Washington, D. C.
3. The Nutritional Requirements of Growing Animals—Prof. W. F. Holst, University of California, Berkeley, Calif.
4. A Parasitological Resume—Dr. Maurice C. Hall, Chief, Zoological Division, B. A. I., Washington, D. C.
5. Existing Relations Between the Veterinarians and the Humane Organizations—Dr. W. A. Young, The Animal Rescue League, Boston, Mass.
6. Intestinal Protozoa in Man and Animals—Dr. John F. Kessel, University of Southern California, Los Angeles, Calif.
7. Medical and Veterinary Jurisprudence—Judge Charles W. Fricke, Superior Court of California, Los Angeles, Calif.

SECTION ON SANITARY SCIENCE AND FOOD HYGIENE

8. The Bionomics of the Liver Fluke—Dr. J. N. Shaw, Oregon Agricultural College, Corvallis, Oregon.
9. A Review of Tuberculosis Control in California—Dr. J. P. Iverson, State Veterinarian, Sacramento, Calif.
10. Anthrax Control on the Western Range—Dr. E. R. Derflinger, State Live Stock Sanitary Board, Salem, Oregon.
11. Actinobacillosis—Dr. A. J. Damman, Vancouver, Brit. Col.
12. Tularemia—Dr. R. R. Parker, U. S. Public Health Service, Hamilton, Montana.
13. The Detection of Horse Meat and Other Adulterants in Sausage—Dr. F. M. Bolin, Oregon Agricultural College, Corvallis, Oregon
14. The Practical Side of Meat Inspection—Dr. J. G. Jervis, Milner, B. C.
15. Recent Progress in Duck Disease Studies—Paul A. Shaw, Toxicologist, California Fish and Game Commission, San Francisco, Calif.
16. Sanitary Science, the Basis for Abortion Control—Drs. Walter Wisnicky and V. S. Larson, Wisconsin Department of Agriculture and Markets, Madison, Wis.

17. Brucelliasis in Swine at the University of California, with an Epidemiological Report of Its Spread to Two Attendants —Drs. J. A. Howarth and F. M. Hayes, Division of Veterinary Science, University of California, Davis, Calif., and Dr. J. C. Geiger, Hooker Foundation for Medical Research, University of California, San Francisco, Calif.

DR. H. E. BIESTER
Chairman, Section on
Education and Research

DR. W. A. HAGAN
Secretary, Section on
Education and Research

SECTION ON EDUCATION AND RESEARCH

18. The University of California Committee for the Study of Brucella Infection—Dr. C. M. Haring, University of California, Berkeley, Calif.
19. Fertility Studies in the Bull—Drs. C. R. Donham and B. T. Simms, Oregon Agricultural College, Corvallis, Oregon.
20. The Incidence of *B. Abortus* Agglutinins in Human Sera—Dr. R. A. Whiting, Research Institute of the Zoological Society of San Diego, San Diego, Calif.
21. Correlation of Blood Reactions with the Breeding Records Over a Period of Years in an Abortion-Infected Herd of Cattle—Dr. C. F. Clark, Michigan State College, East Lansing, Mich.
22. Coccidioidal Granuloma in Animals—Dr. Jacob Traum, University of California, Berkeley, Calif., and Dorothy Beck, California State Department of Health, San Francisco, Calif.

23. Coccidioidin as a Diagnostic Agent in Man and Animals—Dorothy Beck, California State Department of Health, San Francisco, Calif., and Dr. Jacob Traum, University of California, Berkeley, Calif.
24. *Salmonella Enteritidis* Infection in Guinea Pigs and Rabbits (Illustrated)—Drs. R. C. Duthie and C. A. Mitchell, Animal Disease Research Institute, Ottawa, Canada.
25. The Museum of Pathology—A Neglected Institution—Dr. William H. Feldman, The Mayo Foundation, Rochester, Minnesota.
26. Histopathology of the Central Nervous System in Hog Cholera—Dr. O. Seifried, Der Tierseuchen-Institut der Landes-Universität, Giessen, Germany.
27. The Bacillus of Swine Erysipelas Associated with Arthritis in Lambs—Dr. Hadleigh Marsh, Montana Veterinary Research Laboratory, Bozeman, Montana.
28. Chloroform-Treated Rabies Vaccine—Major R. A. Kelser, Army Medical School, Washington, D. C.
29. Salmon Poisoning—Drs. B. T. Simms, C. R. Donham, J. N. Shaw and A. M. McCapes, Oregon Agricultural College, Corvallis, Oregon.
30. Preliminary Report in the Study of Blood Pressure of the Ox and the Horse—Drs. N. G. Covington and G. W. McNutt, State College of Washington, Pullman, Wash.

DR. C. W. BOWER
Chairman, Section on
Small Animals

DR. C. F. SCHLOTTHAUER
Secretary, Section
on Small Animals

SECTION ON SMALL ANIMALS

31. Recent Advances in the Prophylaxis and Treatment of Canine Distemper—Dr. F. W. Wood, The Cutter Laboratory, Berkeley, Calif.
32. Clinical Manifestations of Pathological Conditions of the Genital Organs of Small Animals—Dr. James B. Jones, West Hollywood, Calif.
33. Small-Animal Hospitalization—Dr. W. E. Frink, Los Angeles, Calif.
34. Normal Saline Solution in Canine Practice—Dr. H. Calvin Rea, Charlotte, North Carolina.
35. Canine Obstetrics and Parturition Diseases—Dr. H. A. Gould, Hollywood, Calif.
36. Care and Feeding of Small Animals in a Zoological Park—Dr. C. V. Noback, New York Zoological Park, New York, N. Y.
37. Diseases of the Mouth in the Dog—Dr. E. A. Ehmer, Seattle, Wash.
38. Bulla-osteotomy in the Dog—Drs. G. W. McNutt and J. E. McCoy, State College of Washington, Pullman, Wash.

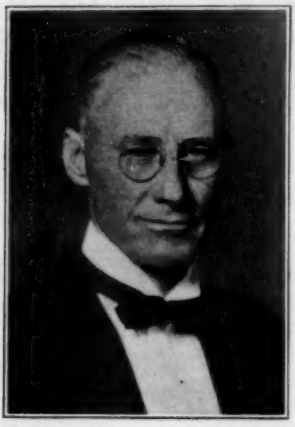
DR. W. R. HINSHAW
Chairman, Section on Poultry

DR. R. O. BILTZ
Secretary, Section on Poultry

SECTION ON POULTRY

39. Accuracy of Three Cooperating Laboratories in Detecting Pullorum Disease by Agglutination Test—Dr. J. Biely, University of British Columbia, Vancouver, Brit. Col.

40. Some Recent Studies in Poultry Diseases—Dr. George Kernohan, University of California, Petaluma, Calif.
41. Studies in the Pathology of Avian Coccidiosis—Dr. H. J. Stafseth, Michigan State College, East Lansing, Mich.
42. Histological Studies on A-Avitaminosis and Coryza in Chickens—Dr. O. Seifried, Der Tierseuchen-Institut der Landes-Universität, Giessen, Germany.
43. Studies in Avian Largynotracheitis—Drs. Robert Graham, Frank Thorp Jr., and W. A. James, University of Illinois, Urbana, Ill.
44. Coccidiosis of the Chicken with Special Reference to Species —Dr. W. T. Johnson, Oregon, Agricultural College, Corvallis, Oregon.



DR. H. E. KINGMAN
Chairman, Section on General Practice

DR. W. H. LYTLE
Secretary, Section on Sanitary Science and Food Hygiene

SECTION ON GENERAL PRACTICE

(Titles of papers to be presented not received in time for publication).

Hawaiian Excursion

The Los Angeles Chamber of Commerce has extended an invitation to members of the A. V. M. A. to participate in the Hawaiian excursion which leaves the convention city on September 6. Further information may be obtained by writing Mr. Charles P. Bayer, Field Secretary and Excursion Manager, Los Angeles Chamber of Commerce.

An Invitation to the Ladies

The ladies of California send greetings to all ladies of the profession. We are preparing a fine program of entertainment and hope for a large number to be here to participate in the good times which will be yours by coming to Our Only California. We hope to see many new faces, as well as all who have been here before.

MRS. J. L. TYLER, *Chairman*,
Sub-Committee on Reception and Entertainment of Ladies.

Los Angeles County Examinations

Dr. L. M. Hurt announces that the Los Angeles County Civil Service Commission plans to hold an examination for the benefit of those who would like to have their names appear on an eligible list from which county positions may be filled during the ensuing year. The examination will be held during the week of the convention. Exact time and place will be announced at the meeting.

APPLICATIONS FOR MEMBERSHIP

(See July, 1930, JOURNAL)

FIRST LISTING

ARGUE, CAMERON W. 7737 Gratiot Ave., Detroit, Mich.
D. V. M., Ohio State University, 1930
Vouchers: W. F. Guard and R. E. Rebrassier.

BRADSHAW, GEO. B. Box 725, Jackson, Miss.
D. V. M., Alabama Polytechnic Institute, 1919
Vouchers: Hartwell Robbins and S. J. Horne.

DELAPLANE, JOHN P. Ohio State Univ., Columbus, Ohio
D. V. M., Ohio State University, 1929
Vouchers: R. E. Rebrassier and W. F. Guard.

ELLIOT, JOHN TAYLOR R. R. 2, Uxbridge, Ont.
V. S., Ontario Veterinary College, 1894
Vouchers: R. A. McIntosh and H. M. LeGard.

EVERS, JOHN R. Bristol, Wis.
D. V. M., Indiana Veterinary College, 1921
Vouchers: James S. Healy and H. D. Larzelere.

FIDLER, CHARLES EDMOND 826 N. 5th Ave., Kankakee, Ill.
M. D. C., Chicago Veterinary College, 1905
Vouchers: H. S. Wooters and L. A. Merillat.

HALPIN, NEIL J. C. 80 N. Daisy Ave., Pasadena, Calif.
B. S., D. V. M., Washington State College, 1929
Vouchers: W. L. Curtis and T. H. Agnew.

HOLMES, HERBERT NASH Buffalo, Ill.
B. V. Sc., Ontario Veterinary College, 1910
Vouchers: C. C. Hastings and G. G. Graham.

HOSTETLER, ORVAL HERBERT Box 133, Nampa, Idaho
B. S., D. V. M., Washington State College, 1930
Vouchers: W. A. Sullivan and A. J. Dickman.

HUMMON, ORMOND J. Leipsic, Ohio
D. V. M., Ohio State University, 1930
Vouchers: W. F. Guard and R. E. Rebrassier.

JONES, THOMAS BENTON 2142 W. Van Buren St., Phoenix, Ariz.
D. V. S., Kansas City Veterinary College, 1907
Vouchers: W. L. Curtis and J. C. McGrath.

JORGENSEN, A. B. Antigo, Wis.
V. S., Ontario Veterinary College, 1908
Vouchers: James S. Healy and C. F. Van de Sand.

KRIEGER, GUSTAVE LOUIS Box 1015, Bartlesville, Okla.
D. V. M., Kansas State Agricultural College, 1924
Vouchers: C. R. Walter and R. R. Dykstra.

MCCRORY, BRYCE R. State Laboratories, Reynoldsburg, Ohio
D. V. M., Colorado Agricultural College, 1927
Vouchers: R. E. Rebrassier and W. F. Guard.

MOHRI, V. C., LT. RALPH W. 324 Garland Ave., Takoma Park, Md.
D. V. M., Kansas State Agricultural College, 1929
Vouchers: R. A. Kelser and Geo. H. Koon.

MOORE, KENNETH RUSSELL Woodville, Ont.
B. V. Sc., Ontario Veterinary College, 1930
Vouchers: W. J. R. Fowler and C. D. McGilvray.

RANDALL, GLEN H. 1855 N. 26th St., Kansas City, Kans.
D. V. S., Kansas City Veterinary College, 1911
Vouchers: Joseph W. Parker and C. C. Donelson.

RICHARDS, W. L. Morrisonville, Wis.
D. V. M., Chicago Veterinary College, 1914
Vouchers: B. A. Beach and W. Wisnicky.

ROSENGREN, M. W. Ackley, Iowa
D. V. S., Kansas City Veterinary College, 1909
Vouchers: Grant B. Munger and John B. Bryant.

SCHANTZ, LANSING C. Constableville, N. Y.
D. V. M., Cornell University, 1930
Vouchers: W. A. Hagan and C. E. Hayden.

THOM, MYRON A. 816 S. San Pedro St., Los Angeles, Calif.
B. S., D. V. M., Washington State College, 1929
Vouchers: W. L. Curtis and C. A. White.

TRIPP, LYNN HOWARD Room 93, County Court House, Albany, N. Y.
D. V. M., Cornell University, 1918
Vouchers: E. T. Faulder and Chas. Linch.

ZINGG, HENRY F. New Glarus, Wis.
D. V. M., Iowa State College, 1926
Vouchers: C. F. Van de Sand and James S. Healy.

Applications Pending

SECOND LISTING

Anderson, Walter Raymond, R. 3, Box 70, Worthington, Minn.
Baker, Donald Wyckoff, N. Y. State Vet. Coll., Ithaca, N. Y.
Bartlett, Densil Clyde, R. R. 1, Mount Vernon, Ohio
Bowen, Abram Temple, Montvale, N. J.
Braun, Edward Robert, 722 E St., Eureka, Calif.
Briggs, Merton Lorenzo, 525 Benson St., Camden, N. J.
Cobb, Troy Benton, Adel, Ga.
Crago, Charles Clarence, 598 South St. S. E., Warren, Ohio
Echols, Byron C., 101 Mission Drive, San Gabriel, Calif.
Eichhorn, Herbert J., Edison, Ohio
Hisel, Clarence C., 209 W. 20th St., Oklahoma City, Okla.
Horstman, Carl H., Jackson, Minn.
Huggler, George William, State Road, Paoli, Pa.
Jerome, Geo., R. F. D. 5, Box 129 E, West Allis, Wis.

Johnson, Leslie Edwin, Melvin, Ill.
Keagy, Hilan Franklin, 2121 Pico Blvd., Santa Monica, Calif.
Leasure, Thomas J., Solomon, Kans.
McAlister, Rancie Grover, General Delivery, Los Angeles, Calif.
Moore, Earl N., c/o Oglebay Hall, Univ. of W. Va., Morgantown, W. Va.
Mueller, Charles E., Ogallala, Nebr.
Ogden, Wilburn O., Hominy, Okla.
Orr, Aquilla E., 504 N. Mt. Olive St., Siloam Springs, Ark.
Otis, George M., 1674 Kinnickinnic Ave., Milwaukee, Wis.
Pavey, William Hugh, Sabina, Ohio
Runnels, Charles Forest, 88 S. 3rd St., Newark, Ohio
Seitz, Palace H., 439 E. Main St., Dallastown, Pa.
Sherer, Kenneth B., R. R. 1, Helena, Ohio
Simpkins, Earl James, 26 Fell St., San Francisco, Calif.
Smallbone, George M., 46 Quincy Ave., Long Beach, Calif.
Stevens, W. Vance, Box 183, Mount Vernon, Ohio
Wight, Chas. Henry, 2709 Moss Ave., Los Angeles, Calif.
Wilson, Ralph A., Waldo, Ohio

The amount which should accompany an application filed this month is $7.08, which covers membership fee and dues to January 1, 1931, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

Connecticut Veterinary Medical Association. Milford, Conn. August 6, 1930. Dr. E. H. Patchen, Secretary, 83 New Haven Ave., Milford, Conn.

East Tennessee Veterinary Medical Society. Chattanooga, Tenn. August 9, 1930. Dr. R. E. Baker, Secretary, Morristown, Tenn.

Hudson Valley Veterinary Medical Society. West Point, N. Y. August 13, 1930. Dr. J. G. Wills, 122 State St., Albany, N. Y.

American Veterinary Medical Association. Ambassador Hotel, Los Angeles, Calif. August 26-29, 1930. Dr. H. Preston Hoskins, Secretary, 537 Book Bldg., Detroit, Mich.

New York State Veterinary Medical Society. Ithaca, N. Y. September 15-16, 1930. Dr. C. E. Hayden, Secretary, 110 Irving Place, Ithaca, N. Y.

Kansas State Agricultural College Conference for Veterinarians. Kansas State Agricultural College, Manhattan, Kans. October 16-17, 1930. Dr. R. R. Dykstra, Dean, Kansas State Agricultural College, Manhattan, Kans.

International Association of Dairy and Milk Inspectors. Hotel Statler, Cleveland, Ohio. October 22-24, 1930. Dr. Paul P. Brooks, Secretary, State Department of Health, Albany, N. Y.

American Public Health Association. Fort Worth, Texas. October 27-30, 1930. Homer N. Carver, Executive Secretary, 370 Seventh Ave., New York, N. Y.

ANIMAL PARASITES OF CHICKENS IN OHIO AND WEST VIRGINIA*

By J. H. Rietz, *Morgantown, W. Va.*

West Virginia University

Introduction

The object of this work was to determine the species of animal parasites infesting the gastro-intestinal tract of chickens, and the extent of distribution of these parasites, in Ohio and West Virginia.

Source of Material

The results of findings reported in this abstract are from 132 farms and poultry flocks located in Ohio and West Virginia, the number of flocks being equally divided between the two states. The adult chickens received for autopsy and diagnosis in the Pathology Laboratory of the College of Veterinary Medicine, Ohio State University, and those received in the Animal Pathology Laboratory of the West Virginia State Department of Agriculture and College of Agriculture, West Virginia University, constituted the actual material examined.

From the date of examination of the first material until the discontinuance of the collection, all adult birds received, regardless of the condition for which submitted, are included in the report. A total of 245 individual birds were examined. One hundred forty-three originated in Ohio and 102 in West Virginia.

The geographic location of the farms from which the birds originated are well distributed over the two states and the findings should be fairly representative of the distribution of the animal parasites infesting the alimentary tract of chickens in Ohio and West Virginia.

Result of the Investigation

Representative species belonging to three phyla, namely, Nemathelminthes, Platyhelminthes and Protozoa, were found.

Table I shows the number and percentage of farms infested with the various species of parasites found.

Of the total of 132 flocks from which chickens were examined, 30 were free from parasites, assuming that the individuals

*Abstract of thesis presented for part-time credit for the degree of Master of Science, Ohio State University, 1929.

examined represented the condition of the flock, 16 of these being located in Ohio and 14 in West Virginia.

Five species (*Ascaridia lineata, Heterakis gallinae, Davainea proglottina, Choanotaenia infundibulum* and *Capillaria columbae*) of parasites was the greatest number encountered in one flock.

Parasites were found in 50 of the 66 flocks examined in Ohio. Parasitism was diagnosed as a cause of the trouble in 45 of these 50 flocks. Parasites were found in 52 of the 66 flocks examined in West Virginia. Parasitism was diagnosed as a cause of the trouble in 45 of these 52 flocks. There was a total of 90 flocks, of the grand total of 132 flocks examined, that showed parasitism to be

TABLE I—*Species of parasites found and relative frequency*

PARASITE	OHIO		W. VA.		TOTAL	
	No.	%	No.	%	No.	%
Ascaridia lineata	19	28.78	21	31.81	40	30.30
Capillaria colombae	9	13.63	6	9.09	15	11.28
Heterakis gallinae	30	45.45	24	36.36	54	40.90
Capillaria retusa	5	7.57	5	7.57	10	7.57
Capillaria strumosa	2	3.03	1	1.51	3	2.27
Capillaria collaris	0	0.00	2	3.03	2	1.51
Cheilaspirura hamulosa	3	4.55	2	3.03	5	3.78
Choanotaenia infundibulum	11	16.66	13	19.69	24	18.25
Davainea proglottina	11	16.66	17	24.75	28	21.21
Davainea tetragona	5	7.57	0	0.00	5	3.78
Davainea echinobothrida	8	12.12	6	9.09	14	10.61
Hymenolepsis carioca	5	7.57	1	1.51	6	4.54
Davainea cesticillus	1	1.51	0	0.00	1	0.75
Metroliasthes lucida	0	0.00	1	1.51	1	0.75
Eimeria avium	4	6.06	10	15.15	14	10.61
Gregarinae sp.	3	4.55	2	3.03	5	3.78

the direct cause or a very important contributing cause of the trouble.

Determination of symptoms produced by different species or even genera could not be made with any degree of accuracy, because of the complications of other diseases or infestation with more than one species of parasite. Infestation with one species only was relatively rare and, when found, other conditions were involved that rendered it impossible to make deductions relative to the symptoms attributable to the parasites.

A careful check of the symptoms, as far as they could be obtained, shows that all birds that exhibited symptoms of paralysis or incoordination were infested with either cestodes or capillaria, or both. All birds exhibiting symptoms of impaired vision or total blindness carried an infestation with one or more species of

cestodes. The individual species of parasite causing or contributing to these conditions could not be determined from this survey.

Summary

Cestodes ranked first in the number of infestations, being found in 79 of the 132 flocks. Heterakidae ranked second, being found in 54 of the flocks. Ascaridia ranked third, being found in 30 flocks. Coccidia ranked fifth, being found in 14 flocks. Gizzard worms and gregarines were tied for sixth place in rank as to number of infestations, each being found in 5 flocks. While we are thus counting the gregarines as parasitic in the chickens, there remains some doubt as to the correctness of this view.

Addendum

Since the completion of the examination of the material, the abstract of which precedes, a flock of chickens infested with a small trematode was located at Wardensville, West Virginia. Fixed specimens of these parasites measured from 5.4 mm. to 7.7 mm. The parasites were found only in the duodenum. The species has not been determined.

Grand Canyon Lodge, Union Pacific Lines

THE INCIDENCE OF SWAMP FEVER IN SASKATCHEWAN IN RELATION TO SOIL TYPE

By J. S. FULTON, *Saskatoon, Sask.*

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Most writers agree that swamp fever, as the name implies, is a disease common to low-lying wet lands. It has also been noted by some, however, that the disease is not wholly confined to marshlands, nor is it present on all lands which are low-lying and boggy. Van Es, Harris and Schalk[1] state:

> It would seem that most of our cases come from the lower sections of the country, although many reports indicate that the disease may occur on high and dry land, where deficient drainage could not possibly be an etiologic factor.

Torrance[2] considers the disease more common in low-lying, marshy sections and that it is more prevalent during wet seasons. Kinsley[3] considers wet seasons as having a direct bearing on the incidence of swamp fever. Francis and Marsteller[4] found the disease common on the low-lying lands along the Gulf of Mexico. Brimhall, Wesbrook and Bracken[5] mention two foci of infection, one on a black loam soil, the other on a light sandy soil. They state the disease was not generally prevalent on the sandy soil although low places could not be excluded in either district.

Swamp fever is prevalent in certain well-defined areas in Saskatchewan, while in other sections isolated cases appear infrequently. In a third area, the disease is non-existent. This fact was noted during the course of an investigation of swamp fever and attention was then paid to topography of country and soil formation in the various areas.

It was observed that, where the disease appears with regularity, the soil varies from a sandy to a heavy loam. Where isolated cases occur, the soil is either of a light sand or of a gradation type, between a very heavy clay and a sandy soil. It is a fact that outbreaks of swamp fever never occur in the heavy clay lands of Saskatchewan.

At one point in the Province, the soil changes abruptly from a heavy clay to a sandy loam with no gradation type between. At this point outbreaks of swamp fever appear almost every year on the loam soil a few miles from the dividing line, but I have not been able to locate even an isolated case in the clay lands close to

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the soil change. The prevalence and absence of the disease within a few miles at this point is striking.

The question which next received attention was the occurrence of sloughs and swampy lands in the various areas. It is true that in the swamp fever districts there are more sloughs than in the disease-free area, but ponds and small swamps are encountered all over Saskatchewan, in fact, in one part of the swamp fever-free area, sloughs are quite abundant. The only noticeable difference in the sloughs in the various sections is the amount of vegetable growth present. Ponds, in the clay section, are comparatively free of growth, while in the loams, growth is rank. This growth extends into the shallow water and remains in contact with the water except in dry seasons, when the water may recede below the growth-line.

These differences did not at first appear significant in connection with the incidence of swamp fever; later it was found that the presence or absence of vegetable matter had a direct bearing on the hydrogen-ion concentration of the waters, rendering them either suitable or unsuitable for the growth of pathogenic organisms.

Seasonal Changes in the Water

Slough waters, in the clay soils, are decidedly alkaline in reaction from early spring until freeze-up, whereas in the loam soils, a change takes place as the season advances. Waters in the loam areas are alkaline in reaction during the early spring when the water level is high, but, as the season advances, a change to neutral and then to acid is noted. This change may be halted, or the reaction may again become alkaline, as a result of rainfall. Should the water recede below the vegetable growth-line, the reaction changes suddenly back to the alkaline side.

During the season of change from alkaline to acid, the water temperature rises, of course, and in many instances reaction and temperature both become suitable for the growth of micro-örganisms at the same time. When these points are reached, it has been found that swamp fever cases begin to appear. It might be stated further that in every instance where outbreaks of swamp fever have been investigated, the hydrogen-ion concentration of the slough waters has ranged from 7.0 to 7.6.

As has already been stated, the disease appears only periodically in the sandy soils of Saskatchewan. In the sandy districts sloughs dry much earlier in the season than they do in the more

impervious soils, where water loss is chiefly from evaporation. As a rule sloughs in the lighter soils are dry before suitable growth temperatures are reached, while proper reaction for growth is of short duration. In particularly wet seasons, when ponds are kept at a high level, suitable temperature and reaction may be maintained for some considerable time and it is then that outbreaks of swamp fever do occur in these light soils.

In the gradation type of soil, where clay predominates, water reactions are alkaline, changing gradually to the neutral zone as the loam soil is reached. At the northern part of the gradation belt, where loam begins to predominate, cases of swamp fever become more common.

The season of 1929 proved to be an ideal one in which to make a comparative study of the effect of rainfall in the different parts of the disease area. Throughout the northern part there was little or no rain, resulting in the slough waters changing rapidly from alkaline to acid. By the end of June, most of the waters had gone down below the line of growth and a decided change back to the alkaline side occurred.

The change from alkaline to acid, and back to alkaline, took place in many instances when the water temperature was not over 15°C. The length of the time the reaction remained in the neutral zone was short, in some cases only a few days.

Rainfall and Incidence of Swamp Fever

Very few cases of swamp fever developed in the north and not a single extensive outbreak could be located. Sufficient rain fell in the southeastern part to keep the sloughs fairly well filled until late in the season. The hydrogen-ion concentration, in consequence, was kept between 7.0 and 7.4 until about the middle of August, when it changed to 6.4 and 6.8. In ponds, where the water sank below the growth-line, the reaction changed to 8.0 and 8.6, but this did not occur until late September or October. Cases of swamp fever began to appear in the southeast late in June and outbreaks were reported throughout this district until September. The disease was much more prevalent in this section than it had been for many years.

Within the general swamp fever area there are farms where the disease is unknown, while on the adjoining farms cases develop regularly. Eight such farms are known to the writer and although horses are allowed to run at pasture in which there are sloughs, they remain healthy. On these farms the only noticeable

difference is the fact that the sloughs are decidedly alkaline in reaction, in fact they are spoken of as alkaline bogs because of the deposits of salts in and around the ponds.

Although the incidence of the swamp fever is greater among pastured animals, the writer is well aware that swamp fever develops among horses that are not running at pasture and that it appears even among city animals. It is a fact, however, that fewer animals are affected when the disease appears among non-pastured horses.

It is not surprising that stabled horses do become affected when the work of Scott,[6] in connection with fly transmission, be considered in conjunction with results obtained during the present investigation. It has been found that horses which have never shown symptoms of swamp fever may be virus carriers and in some cases blood from these animals has proved to be particularly virulent.

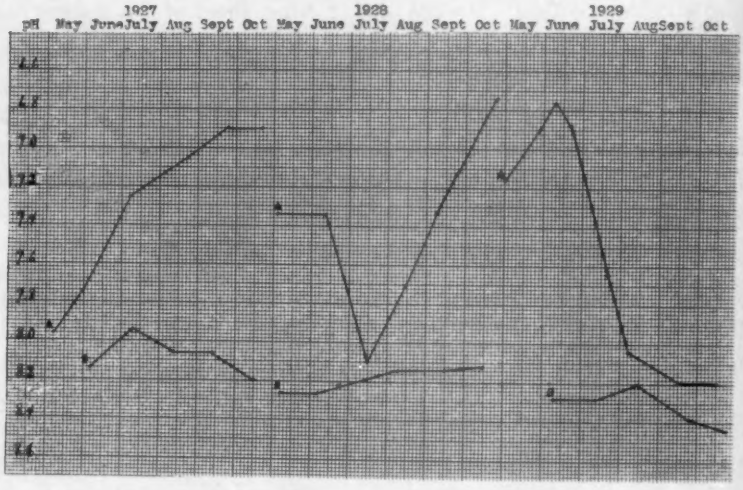

FIG. 1. Chart showing change of pH of slough waters.

EXPLANATION OF CHART

Rainfall in 1927 was normal and water in pond A did not fall below the growth line. There was little snow water in the spring of 1928 and the weather remained dry until late June and July, when rain fell daily. Dry weather prevailed from the middle of July until freeze-up. The summer of 1929 was very dry and late in June the water in pond A fell below the growth line, where it remained until freeze-up. In 1927, cases of swamp fever were common from late June until fall. Cases were late in appearing in 1928 and in 1929 very few cases could be located in the section where pond A was located. Pond B is located in the non-swamp fever area and is typical of most ponds examined in that part.

Test Inoculations

Five cubic centimeters of blood taken from a mare raised by the owner and never known to be sick was introduced into a healthy, two-year-old colt (C-1-7). The temperature remained normal, until the fourteenth day, when it rose to 104°F., and to 106° on the fifteenth day. Typical symptoms of swamp fever developed, the animal dying on the thirty-first day after being inoculated.

Colt C-2-7 received 5 cc of whole blood from the same mare as did colt C-1-7. The temperature rose on the seventeenth day to 105°F. Symptoms of swamp fever were presented and the animal was killed twenty-eight days after the first temperature rise. Blood from colt C-2-7 reproduced the disease in horse M. J. 3-7.

The apparently healthy mare which proved to be a virus carrier is, today, three years after the experiment, still working regularly and is in show condition.

Horse M. J. D-8 received 5 cc of blood from a six-year-old gelding, which had worked for three years without showing any signs of illness. Symptoms of swamp fever developed on the twenty-first day, the temperature rising to 105°F. Normal temperatures prevailed for two weeks, when a second febrile attack commenced.

Horse M. J. 1-9 was inoculated with 5 cc of pooled blood from four apparently healthy animals bred by the owners and never off work owing to sickness. Twenty days after inoculation, the temperature of M. J. 1-9 was 104°F., 105 on the twenty-first day and 106.5 on the twenty-second day. On the thirty-second day after inoculation the animal was destroyed. Two other animals were inoculated with pooled blood from four healthy-looking horses, both of which remained healthy.

The animals from which blood was secured for the above inoculations were all raised in the swamp fever area. They had never changed hands and, therefore, a complete history was secured.

It would appear from these results that many animals contract the disease as colts and the symptoms go unnoticed because of their not being worked. Van Es[1] writes: "The blood may be highly virulent in the absence of all other symptoms or phenomena."

Tests of Infectiousness of Slough Water

That it might be definitely established whether or not slough waters did contain the virus of swamp fever, and if direct infection were possible, the following experiments were carried out.

On September 10, 1928, horse M. J. 4-7 received 30 cc of water intravenously. The water was taken from a slough in a pasture where eight cases of swamp fever had developed during the month of July. The temperature of M. J. 4-7 remained normal until September 28, when it rose to 103°F.; on September 29, to 104.5 and on September 30, to 105.2. Typical symptoms of swamp fever developed and several febrile attacks were noted before the animal was destroyed on January 20, 1929.

On September 10, 1928, Pony S.-8 was given 30 cc of water obtained from the same source as that used for M. J. 4-7. This animal remained normal until September 30, when it was again inoculated with 40 cc of water taken from the same slough. Temperatures were taken daily until December 12 without any change being noted.

On December 13, Pony S.-8 was inoculated subcutaneously with 10 cc of blood taken from C.-4, an experimentally produced case of swamp fever, and again, on December 31, was given 30 cc of blood from C.-4. Pony S.-8 remained healthy. That the blood of C.-4 was virulent is evident from the fact that, on December 31, four other horses, inoculated with 5 cc of blood from this animal, all developed swamp fever, two dying as a result.

Waters collected from seven ponds in the disease-free area were pooled and 40 cc introduced into horse M. J. 2-8 on September 3, 1928. This animal remained healthy, and on September 30 was again given 40 cc of pooled water taken from four sloughs in the non-swamp fever districts. Temperature remained normal until December 5, when the animal was inoculated with virulent blood. Typical swamp fever symptoms developed as a result of this inoculation and the animal was destroyed on January 30, 1929. The hydrogen-ion concentration of the waters used on horse M. J. 2-8 ranged from 8.0 to 8.6 and were collected from sloughs in the heavy clay soils of the southern part of the Province.

On July 29, 1929, horse M. J. A.-8 was inoculated with 60 cc of slough water, taken from a farm on which six cases of swamp fever had developed early in July. Temperature remained normal until August 12, when it rose to 102.0°F., to 104 on the

13th, and 105.5 on the 15th, becoming normal again on September 1. A second febrile attack occurred on September 21. Typical swamp fever symptoms developed and the animal was destroyed on October 5, 1929.

On August 27, 1929, horse U. S.-8, which had been raised on a swamp-fever farm and from an infected mare, was inoculated with 60 cc of water obtained from the same source as that used for horse M. J. A.-8. Results were entirely negative.

On September 6, 1929, horse M. J. H.-9 received intravenously 60 cc of water taken from a lake on a swamp-fever farm. On September 16 and 17, the temperature rose to 104.0°F., to 103 on the 18th, and 101 on the 19th. This animal was injured previous to being inoculated and became so weak that he was unable to rise. Was shot on September 21.

September 6, 1929, horse M. J. 1-9 was inoculated with 60 cc of slough water. On September 28, the temperature rose to 101.2°F., on the 29th to 102.0, on the 30th to 104.0, and on October 1 to 104.5. During a second febrile attack the temperature rose to 106.0. Typical symptoms of swamp fever appeared and later the blood from horse M. J. 1-9 proved virulent.

It is interesting to note that pony S-8 and horse U. S.-8 were both raised in swamp-fever districts, whereas all other animals used in these experiments were secured from parts of the Province where the disease is unknown. No doubt both of these animals were swamp fever cases, since we have never found an animal insusceptible to the disease when brought from a disease-free area.

Local Horses Unsatisfactory for Experimental Work

When the work commenced here it was noted that local horses were unsuitable for experimental work, many remaining healthy after being inoculated with virulent blood. It was found also that these animals were virus carriers, which was no doubt the reason for their insusceptibility.

Microscopic examination of slough waters showed an abundance of animal life. Certain waters were found to harbor spirochetes, but these organisms were only found in ponds where there was considerable vegetable growth and where the reaction was not far removed from the neutral point. As the season advanced and sloughs became acid, active spirochetes began to disappear and when the water had receded below the vegetable line and changed to alkaline, spirochetes were altogether absent. Spirochetes

were never found in the decidedly alkaline ponds in the non-swamp fever areas.

I am not even suggesting spirochetes as the cause of swamp fever, but their presence or absence was evidently determined by the reaction of the water, as was also the presence or absence of "that" capable of producing swamp fever.

The work of Buchanan[7] in connection with spirochetal jaundice has some points in common with this work on swamp fever. Outbreaks of spirochetal jaundice among miners suggested the advisability of examining surface and pit waters, which was done on an extensive scale. Buchanan found the organism of spirochetal jaundice in roof slime in certain parts of a mine and when this slime was inoculated into guinea pigs they died from the disease. In roof slime, which was decidedly acid, spirochetes were constantly absent. Waters contained in cement tanks and free from slime and growth did not harbor leptospiras.

The similarity of the two cases is striking. In sloughs, where vegetable growth is plentiful, and where viscid material is found on leaves of the aquatic plants, spirochetes are plentiful. Such waters are in some cases capable of producing swamp fever. Waters from sloughs, where vegetable growth is almost altogether absent, do not harbor spirochetes, nor do they seem capable of producing swamp fever. Evidently "that" which is capable of producing swamp fever requires conditions for growth similar to those of leptospira.

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Teaching Staff at Oka Augumented

Four new professors were added to the teaching staff of l'Ecole Vétérinaire de la Province de Québec, Université de Montréal, during the year 1929-30, according to Dr. Father Leopold, Director. The additions to the faculty included Dr. Jose Maria Rosell, Professor of Bacteriology; Dr. Maurice Panisset, Professor of Physiology; Dr. Antonio Belanger, Professor of Clinical Surgery; and Dr. Alfred Cherrier, Professor of Sanitation.

BROAD-LEAFED MILK WEED (ASCLEPIAS LATIFOLIA) POISONOUS FOR SHEEP AND GOATS

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and
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Although most milk weeds may be considered poisonous for live stock, this species has not been described in the available literature as being of a poisonous nature. Extensive losses in sheep have occurred from time to time in areas where an abundance of this species grows. One could find among these plants some that had been browsed upon so recently that the milk was still oozing from the freshly cropped leaves or stalks.

DESCRIPTION

The broad-leafed milk weed, *Asclepias latifolia* (Torr.), Raf., is a perennial plant with a stout and simple stem bearing about five pairs of large and very thick leaves which are nearly as broad as long, often emarginate, subcordate at base and nearly sessile. The flowers are greenish and in densely many-flowered umbels with short peduncles, and the fruit consists of from two to four follicles that are erect on deflexed pedicles, the follicles being smooth and about one and one-half inches long.

OCCURRENCE

The broad-leafed milk week has a fairly wide distribution over the dry plains from Kansas and Colorado to Texas and Arizona. In Texas it is known to grow on the High Plains, the Edwards Plateau, and the Trans-Pecos areas. It commonly grows on good grass land. To our knowledge the most extensive losses of range live stock have been on the Eldorado Plains of the Edwards Plateau and particularly in northern Crockett and southern Irion counties.

EXPERIMENTAL

Quantities of green, vigorous plants in the flowering stage with good development of foliage were gathered in July, 1929, and allowed to dry. The dried leaves were broken from the stems,

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finely ground through a meat grinder, then suspended in tap water and given as a drench by means of a stomach-tube.

Two animals, a goat and a sheep, were selected for the test. Sheep 1211, an aged wether, weighing 103.5 pounds, was drenched July 9, 1929, at 8:30 a. m., with 100 gms., or 0.21 per cent live body weight, of the ground leaves suspended in 7⅓ liters of water. At noon this sheep was noticeably depressed and standing quietly with the head down. By 2 p. m., approximately 5 hours after the milk weed had been given, it was dead.

Goat 163, an aged chevon, weighing 114.0 pounds, was drenched October 7, 1929, at 12 o'clock noon, with a little less than 100 gms., or 0.19 per cent live body weight, of the ground leaves suspended in 3 liters of tap water. Just 3 hours and 40 minutes later, this goat was exhibiting audible symptoms of unrest and pain. By 7 p. m., 7 hours after treatment, the animal was dead.

Symptoms

It has not been possible to observe on the range the symptoms produced by this species of milk weed. Ranchers who have observed the actions describe the animals as having labored respiration, emitting short grunts at each expiration, and an excessive salivation. The animals apparently die quickly and without a struggle, as indicated by the position in which the carcass is found and the condition of the undisturbed ground. These observations have been confirmed to a limited extent by the symptoms described in the feeding tests (table I). However, in addition to these symptoms, goat 163 also exhibited much abdominal pain by getting up and down, bawling, groaning, and moving about in a restless manner.

Pathology

In the sheep and goat on test (table I), the lesions found were much the same, so that these pathological findings are considered fairly typical for this plant poisoning. The liver was congested, swollen and of a dark red color. The spleen was congested and swollen, the pulp degenerated and of a ripened blackberry color. The kidneys were congested. The alimentary tube from abomasum to large colon was congested and in an irritated condition, varying from a slight congestion and catarrhal inflammation to extensive areas of rather severe hemorrhages.

Prevention

This species of milk weed is not eaten by live stock under ordinary circumstances. Losses may be encountered when all

TABLE I—*Milk weed (Asclepias latifolia) feeding test*

ANIMAL	WEIGHT (LBS.)	METHOD OF FEEDING	PART OF PLANT FED	DATE FED	WEIGHT		RESULT
					GMS.	PER CENT BODY WEIGHT	
Sheep 1211 (Aged mutton)	103.5	Via stomach-tube	Dried leaves, *Asclepias latifolia* (specimen No. 1206), ground and suspended in 7⅓ liters of water.	7–9–29 8:30 a. m.	100	0.21	7–9–29. 12 m., standing quietly. 2 p. m., dead, apparently without a struggle. Autopsy—Chronic adhesions of lungs to ribs. Liver—Congested, swollen, dark red color. Spleen—Congested, swollen, blackberry color. Kidneys—Congested. Abomasum—Mucous membrane slightly congested, a few petechiae. Small intestines — Congested, merging into petechiae and extensive severe ecchymosis toward ileo-cecal orifice, great patches of catarrhal inflammation. Cecum—Normal. Large intestine (portion adjacent to cecum)—Slight congestion. Rectum—Normal. Prescapular and prefemoral lymph-glands—Congested
Goat 163 (Aged chevon)	114.0		Dried leaves, *Asclepias latifolia* (specimen No. 1216), ground and suspended in 3 liters of water.	10–7–29 12 m.	100	Less than 0.19 (Animal jumped, spilling a portion of suspension)	10–7–29. 3:40 p. m., Uttering loud groans and bawling, gets up and down in restless manner. 4:05 p. m., salivation, labored respiration, gasps and groans at each expiration. 4:20 p. m., groaning and will not stand up. 7:00 p. m., dead, carcass in position indicating death without a struggle. 10–8–28. Autopsy—Some putrefaction present. Lungs—Congested, mostly hypostatic. Liver—Decomposed. Spleen pulp—Dark and degenerated. Small intestines (leading from abomasum)—Extensive hemorrhagic areas tapering off to a catarrhal inflammation throughout, capillaries engorged toward ileo-cecal orifice

other green feed is scarce or when animals unfamiliar with the vegetation are placed upon a range where this plant grows. Even these deaths are very rare, provided the animals have a plentiful supply of other palatable feed. The most extensive losses from this plant have occurred during the time animals are on the trail, when they become tired and hungry. A costly example of this occurred in former years on the trail between Ozona and the shipping-point at Barnhart, Texas. Extensive patches of this broad-leafed milk weed grow on the range over which the animals were forced to travel to reach their destination. Hundreds of sheep have died during these drives because they were tired and hungry and consequently these green plants were eagerly eaten. The Crockett County Livestock Association now makes a practice of having these plants cut from the highway and holding-traps each season. This procedure, although expensive, has prevented such losses and many times repaid the men who must drive their stock through this country.

SUMMARY

The broad-leafed milk weed (*Asclepias latifolia*) has been found to be poisonous for sheep and goats.

The lethal amount of dried leaves was found to be less than 0.19 per cent body weight for sheep and goats.

Most important of the symptoms seem to be the abdominal pain, excessive salivation, labored respiration and restlessness. The position in which the carcass is found is also a most important finding.

The congested, swollen, dark-red colored liver; congested, swollen, degenerated spleen; and ripened blackberry color of the splenic pulp, plus the congested, catarrhal or hemorrhagic gastro-enteritis, are typical macroscopic lesions.

Tulsa County Veterinary Association

The veterinarians of Tulsa County, Oklahoma, got together and organized the Tulsa County Veterinary Association, on March 20, 1930. The organization was formed to bring about better cooperation between its members, and for the purpose of establishing a spirit of good-fellowship among the veterinarians in the County. The Association meets the second Thursday of each month. The officers elected are: President, Dr. C. R. Walter, secretary, Dr. J. M. Higgins.

THE RESULTS OF THE FIELD AGGLUTINATION TEST FOR BANG DISEASE

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In 1925, Bevan,[1] of Rhodesia, Africa, described a field test for infectious bovine abortion known as the "abortoscope." The test consisted of adding a certain amount of whole blood to standard abortion antigen that contained sodium citrate or

FIG. 1. Adding blood to special abortion antigen in field test. The field test must be done immediately after the blood is drawn.

sodium oxalate. The fresh blood of the animal to be tested was added to the antigen by a wire loop* in the cork stopper of the vial containing the antigen. A similar field test was described in the United States by Skidmore,[2] in which acknowledgment of priority to Bevan is made.

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*The use of the wire loop as a measuring device is covered by U. S. Patent Number 1,482,966, February 5, 1924, issued to L. E. W. Bevan.

The widespread interest in abortion disease control in Illinois prompted a study of the agglutination test at the Laboratory of Animal Pathology and Hygiene, University of Illinois. Blood samples from the same animals were run in parallel by the rapid and field agglutination methods. Huddleson's rapid test was used for comparative purposes to check the field test results. No effort was made to use Bevan's technic of adding the fresh serum to the antigen, although the index of agreement of different field antigens was checked with the results of the rapid test.

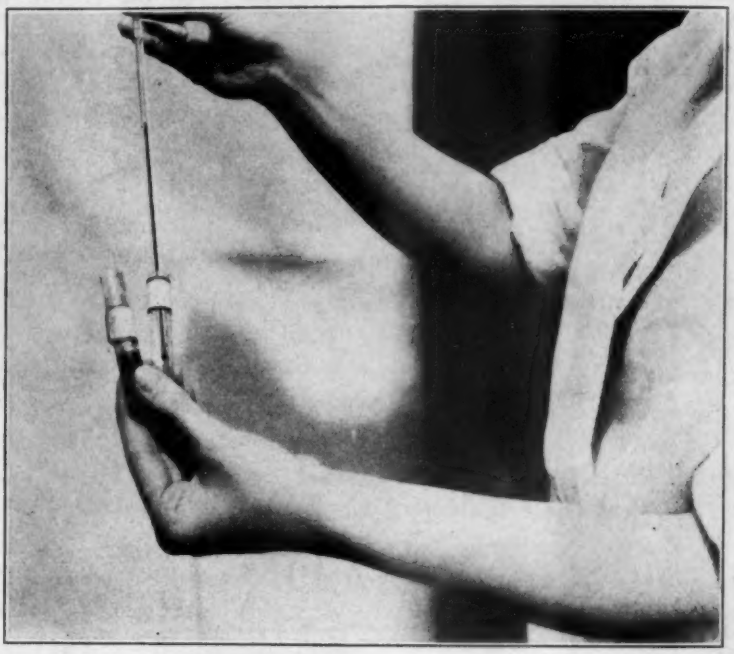

FIG. 2. Adding the whole blood to the special antigen with a pipette. The capillary pipette is more accurate for the addition of blood than the medicine dropper with a rubber bulb.

ANTIGEN

The antigen employed in the field test to be described, at the time consisted of a killed suspension of *Brucella suis* (Traum) grown on agar. A density equivalent to McFarland's nephelometer tube 1 was employed. To the antigen was added .25 per cent phenol and 5 per cent sodium citrate. Two cubic centimeters of this antigen were placed in sterile vials. The field test consisted of pipetting .03 and .06 cc of whole blood to two separate tubes of field antigen (figs. 1 and 2). The whole blood and antigen mixture was gently shaken (fig. 3) to wash the serum

from the cells, and then allowed to stand undisturbed for 48 hours at room temperature. Positives and negatives were judged by the density and size of the antigen particles in the supernatant fluid after slight shaking (fig. 4). Of 552 animals tested by the writers in University herds, 88 were positive in a dilution of 1:200; 12 were positive or partial in a dilution of 1:50; and 452 were negative when the rapid method was used. Of the 88 samples that gave a positive reaction to the rapid antigen in

FIG. 3. The antigen and whole blood are thoroughly mixed. Immediately after the blood is added the tubes are gently rotated in order to wash the serum from the cells.

the laboratory, 4 were negative, 13 were doubtful, and 71 were positive to the field test. From the standpoint of disease control, the positives and doubtfuls were placed in one class, making a

TABLE I—*Results of rapid and field agglutination tests (University of Illinois herds)*

		POSITIVE	DOUBTFUL	POSITIVE AND DOUBTFUL	NEGATIVE	TOTALS
Rapid		88	12	100	452	552
Field	Positive	71	6	77	4	81
	Doubtful	13	1	14	3	17
	Positive and Doubtful	84	7	91	7	98
	Negative	4	5	9	445	454
Totals		88	12	100	452	552

Index of agreement of combined positives and doubtfuls equals 9100
Index of agreement of negatives equals 9845
Index of agreement of two methods equals 9710

total of 84. There were 12 doubtfuls to the rapid test, making a total of 100 positive and doubtfuls. (See table I.)

Using one as perfection, the index of agreement of combined positives and doubtfuls of the two methods was .91, while the index of agreement of negatives of the two methods was .98. The total agreement of the two methods was .97. Stated in another way, there was an agreement of 97 per cent in the results of the field test and the standard laboratory test.

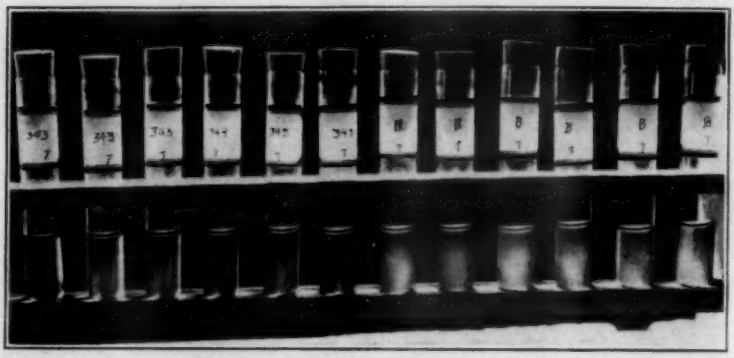

FIG. 4. The results of the field test. The red blood cells settle to the bottom of the tube. In the six tubes on the left, positive agglutination can be observed, while in the six tubes on the right, the results are distinctly negative. The red blood cells have settled to the bottom of each tube.

The favorable results of comparison obtained in the University herds suggested the advisability of practicing veterinarians using this test under field conditions for comparative purposes. In all,

TABLE II—*Results of rapid and field agglutination tests made by 48 practitioners*

		POSITIVE	DOUBTFUL	POSITIVE AND DOUBTFUL	NEGATIVE	TOTALS
Rapid		326	101	427	1848	2275
Field	Positive	240	44	284	161	445
	Doubtful	10	6	16	20	36
	Positive and Doubtful	250	50	300	181	481
	Negative	76	51	127	1667	1794
Totals		326	101	427	1848	2275

Index of agreement of combined positives and doubtfuls equals ..... .7026
Index of agreement of negatives equals ..... .9021
Index of agreement of two methods equals ..... .8640

2,275 cows were tested by 48 practitioners. The results are shown in table II. Of 326 positive reactions to the rapid test, 240 were detected in the field test, while 76 were regarded as negative and ten as doubtful by the practitioners. The index of agreement between the practitioners' field test and the rapid test dropped noticeably in negatives and in combined positives and doubtfuls, to .9021 and .7026, respectively. The index of agreement of the two methods in the hands of the 48 practitioners dropped to .86. That these discrepancies may not be regarded as an indictment against the ability of the practitioner to use the field test, it should be mentioned that the major discrepancies occurred in the hands of two men. The efficiency of the test conducted by individual practitioners is shown in table III, with a correlation of .9312 for the two tests.

TABLE III—*Results of rapid and field agglutination tests (individual practitioners)*

		Positive	Doubtful	Positive and Doubtful	Negative	Totals
Rapid		33	4	37	123	160
Field	Positive	24	1	25	4	29
	Doubtful	5	2	7	2	9
	Positive and Doubtful	29	3	32	6	38
	Negative	4	1	5	117	122
Totals		33	4	37	123	160

Index of agreement of combined positives and doubtfuls equals..... .8648
Index of agreement of negatives equals..... .9512
Index of agreement of two methods equals..... .9312

SUMMARY

The results of parallel field and rapid agglutinations for Brucella agglutinins on the same bovine blood samples suggest that the field test may be efficiently employed by careful practitioners with a relatively high degree of efficiency. It is also apparent that special precautions must be employed if the results compare favorably with the rapid test.

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PSEUDOMONAS PYOCYANEA A SIGNIFICANT FACTOR IN A DISEASE OF CHICKENS*

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We are reporting here an epizoötic in a flock of 400 White Leghorn and Plymouth Rock chicks from five to nine weeks old. The disease is unusual in our experience. The outbreak began in June and lasted until the middle of August. Only about 25 per cent of the 400 chicks survived. Careful study of the disease indicated clearly that it was not due to coccidiosis or to infestation by helminths. The only organism obtained consistently from the chicks was *Pseudomonas pyocyanea* (*Bacillus pyocyaneus*) which was recovered from about 95 per cent of the fifty chicks studied. We have good reason to believe that *Pseudomonas pyocyanea* is the significant factor in this disease.

At the time of the outbreak of the disease, the chicks were running on a range which was covered for the most part with oats two or three feet high. In addition to forage, they were receiving the Wisconsin ration, which consisted of 80 pounds of yellow corn meal, 20 pounds of brown middlings, 5 pounds of bone meal, 5 pounds of fine limestone grit, 1 pound of salt and 7 pounds of meat scrap. This ration was supplemented by sweet milk.

The typical symptoms shown by chicks in the early stages of the disease were: (1) respiratory involvement which might be termed a "cold," (2) inactivity, (3) droopiness, the feathers decidedly ruffled, (4) the eyes closed and the head usually under the wing when the chick was undisturbed, (5) anemic, head and wattles very pale, and (6) temperature abnormally high. When disturbed, the chicks became active and appeared quite normal but when unmolested they sank immediately into a lethargic state. The appetite seemed unaffected. Frequently, when aroused, the chicks would run to the feeder, pick a few times and soon relapse into a somnolent attitude. As the disease progressed they became markedly emaciated. The eyes, which were not at first greatly affected, became more involved as the disease progressed; later there was a watery discharge which became purulent and formed masses of caseous deposits which lined the

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lids. At this stage the appearance of the eye was dull and opaque. In chicks that lived through the first stages of the disease, one or both eyes became swollen and frequently were closed completely. At this stage they had the appearance of chicks suffering from ocular roup. In some instances the sight was completely lost, and the eyeball became atrophied. It might be pointed out that when the eyes had returned to their normal condition the chicks were convalescent. The temperature in the early stages of the disease attained high levels, running up to 108—110° F. In fatal cases the temperature would recede to a subnormal level, falling as low as 94—96° F., which just preceded death. The most prominent conditions of the syndrome were the involvement of the eye and the somnolent attitude which closely simulated symptoms of encephalitis seen in other animals (figs. 1 and 2).

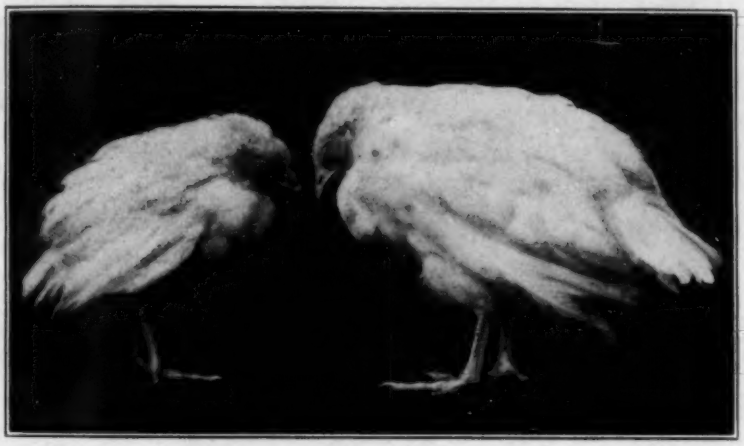

FIG. 1. Spontaneous disease in two chicks. Involvement of the eye is shown in chick on the right.

At necropsy gross lesions were not revealed in any of the chicks. The only divergence from the normal observed was intense congestion of all the viscera. In some respects the symptoms resembled those of coccidiosis in chicks, but repeated examination of stools from sick chicks, scrapings from the ceca and intestines, and histologic sections taken from chicks that had died of the disease, clearly demonstrated that coccidiosis was not the cause of the epizoötic. Occasionally, oöcysts were found but not in sufficient numbers nor consistently enough to account for the disorder. Infestation with helminths was rare. A few of the chicks harbored from two to six tapeworms, but heavy

infestation was never encountered. Nematodes were entirely absent.

Cultures were made from the heart, liver, spleen and brain. In a large percentage of cultures a pure growth of a Gram-negative rod was obtained, which coincided in all cultural aspects with *Pseudomonas pyocyanea*. The organism grew with a spreading growth, depositing a green, diffusible pigment. It had little fermentative power, it liquefied gelatin and it gave a slight growth anaërobically without the production of pigment. We were more successful in isolating this organism from the brain, heart and liver; also, in some cases, blood-smears taken from a sick chick revealed countless numbers of the organisms.

Early in our studies we suspected that a blood parasite might be responsible for the disease, and considerable time was lost in eliminating this possibility. Consequently, repeated blood-

FIG. 2. Chicks showing typical attitudes. All were cases of spontaneous infection.

smears from the wing vein were taken on a series of chicks during the course of the disease. It became evident that the blood of infected chicks invariably contained bacilli. The number present varied greatly from time to time, but in several instances the bacilli were present in surprisingly great numbers in every field of a given smear. Frequently, these organisms adhered to the periphery of the erythrocytes, but they were found also in large clumps (figs. 3 and 4). In such cases it was apparent that the leukocytes were undergoing degeneration, since it was difficult to find a leukocyte in an entire smear. Besides the marked leukopenia, marked anemia was present. Readings taken by means of Tallqvist's hemoglobin scale fell as low as 30.

Rabbits that were injected with 1 cc of the blood of infected chicks became paralyzed in seventeen to twenty-one days,

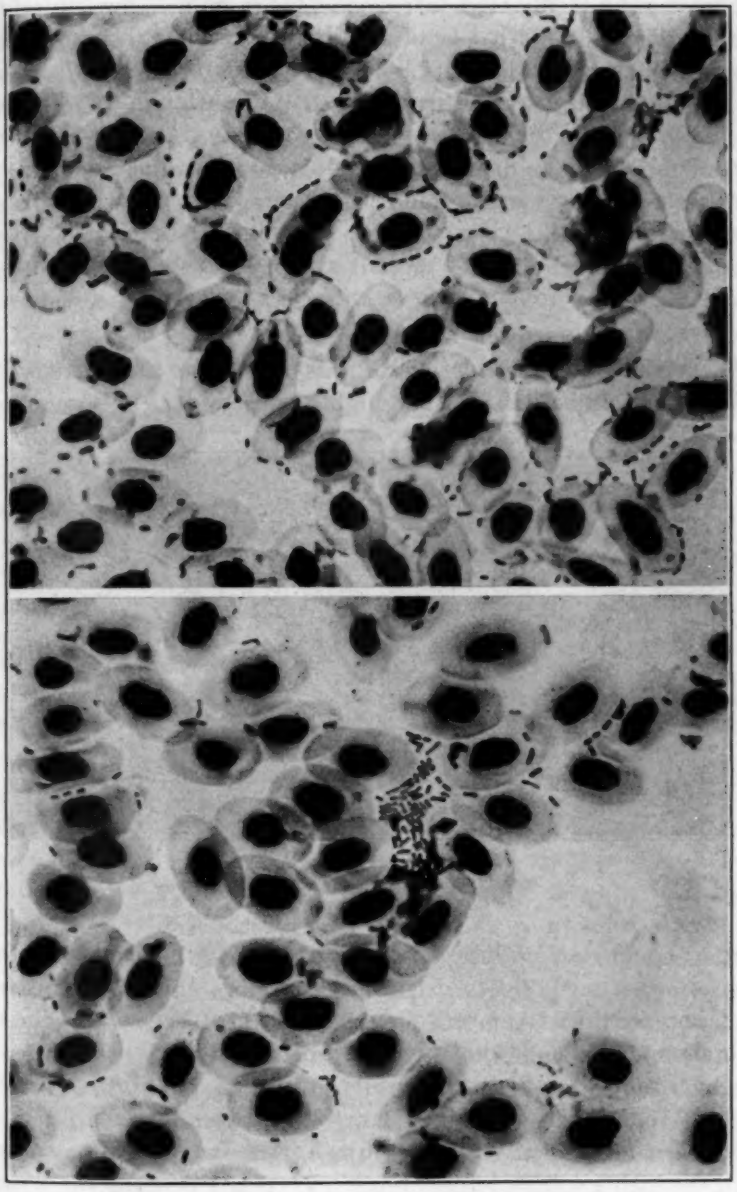

FIG. 3. (Above) Blood smear taken from the wing vein of an infected chick. The bacilli are shown adhering to the periphery of the erythrocytes.

FIG. 4. (Below) Blood smear taken from the wing vein; a clump of bacilli is shown.

whereas rabbits injected intravenously or guinea pigs injected intraperitoneally, with 1 cc of a 24-hour bouillon culture, usually died within sixteen to twenty hours. The different strains isolated from this epizoötic have a great degree of variation in their pathogenicity. One rabbit injected intravenously, August 26, with 0.5 cc of culture 27, died October 29; it was extremely emaciated and was paralyzed in the hind legs; the animal showed signs of paralysis a month before death. The injected animals dying within three days did not present symptoms other than general malaise, and necropsy of these animals showed lesions common to those in acute septicemia.

Experimental reproduction of this condition in chickens by intravenous injection was not highly successful. If doses were

FIG. 5. (Left) Forty-eight hours after injection.
FIG. 6. (Right) Seventy-two hours after injection.

large enough to produce clinical symptoms, the course of the disease was too rapid to exemplify the more chronic conditions encountered in the spontaneous cases. If the dosage was reduced, the chickens did not show evidence of the disease, other than a slight rise in temperature, which returned to normal within twenty-four hours. The chickens that were inoculated with *Pseudomonas pyocyanea* varied in age from five weeks to adults, and through a series of injections it was clearly demonstrated that the older fowls were much more resistant to the infection. An injection of 0.3 cc of culture 155, injected into a five-weeks-old chick, produced death within 24 hours, whereas 1.0 cc of the same culture, given intravenously to an adult hen, did not produce any deleterious effects.

In one series of injections we were able to produce the typical affection of the eye and profound somnolence. A chick was given an intravenous injection of 1.0 cc of a 24-hour culture of bouillon; within 48 hours the chick had a temperature of 110° F. and the eyes contained a watery discharge (fig. 5). Twenty-four hours later, the temperature had dropped to 104° F. and the watery discharge from the eyes had changed to a thick, purulent consistency. The cornea became opaque and there was edema around the eyes (fig. 6). The following day the chick was comatose; the temperature was 98° F. Death followed in a few hours. Pure cultures of *Pseudomonas pyocyanea* were obtained from the brain, heart-blood, liver, spleen and kidney. The usual congestion of all the internal organs was present. The chick was obtained from a flock which was free of disease, isolated in a new cage as soon as it was brought on infected premises, and the injection was given the following day. Symptoms of the disease followed 48 hours after injection, precluding any possibility of spontaneous infection.

The cultures isolated in this epizoötic were pathogenic for guinea pigs, death often resulting from intraperitoneal injections of doses as small as 0.2 cc, and the organism was recovered by smears and cultures of the peritoneum. The organism could easily be recovered in pure culture from the brain of rabbits or chickens that had been given injections intravenously.

In making a study of the agglutinating power of the strains of the organism isolated, thirty chicks left from the affected flock were bled and the serum was titrated with an antigen made from six different strains of the organism. The antigen was made from a 48-hour culture grown on beef infusion agar, which was washed off and diluted with sterile physiologic sodium chlorid solution. Dilutions of 1:20, 1:50, 1:100 and 1:200 were used, and approximately 50 per cent of the chicks gave complete agglutination in dilutions up to 1:100. Normal fowls, some of which were adults, then were bled and this serum was titrated, using the same antigen as before, but in the latter series there was no evidence of agglutination in the tubes having more than 1:20 dilution. It should be stated, however, that all the remaining chicks in the affected flock were not definitely known to have had the disease, which may account to some extent for the variation in agglutinating power of the different serums.

The histologic study of chicks that had died of this disease was negative. The only pathology consistently encountered, in sections

of the liver, lungs, kidneys, spleen, intestine and brain studied, was active hyperemia. The liver in a few of the more chronic cases presented minute areas of coagulation necrosis. The intestine in four cases presented a picture of severe enteritis, in which the mucosa had undergone necrosis with the epithelium discharged into the lumen of the bowel. The necrosis usually was diffuse, affecting only the superficial layer of cells, but in a few areas the necrosis was ulcerative, extending to the glandular

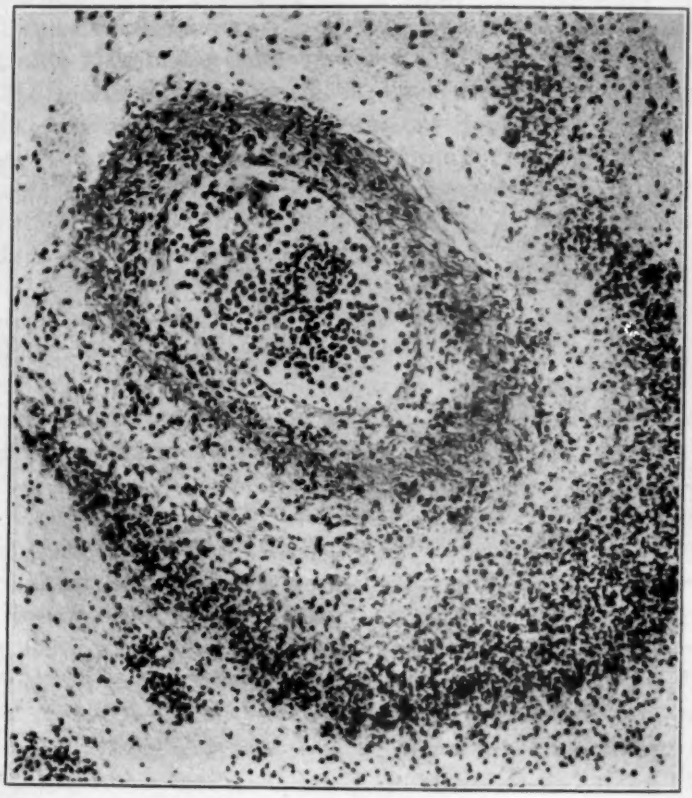

FIG. 7. Necrotic area around vein.

area of the intestine. These conditions did not occur in a sufficient number of cases to permit them to be considered as typical lesions.

Examination of the brain in the spontaneous cases was negative for lesions, but in some of the chicks that were given intravenous injections there was evidence of meningitis, shown by the congestion of the meninges, especially over the medulla. Micro-

scopic sections in these cases showed infiltration of monocytes and lymphocytes beneath the pia mater. In one case, in which intravenous injection was given with 1.0 cc of a broth culture, there was necrosis around the larger vessels of the brain (fig. 7). At the periphery of the necrotic area around the vessels were many eosinophils and monocytes. Nearer the wall of the vessel there were many pyknotic nuclei and some cellular débris. The wall of the vessel showed evidence of retrogression, and large numbers of leukocytes could be distinguished within the lumen of the vessel.

Comment

The literature contains many reports which describe *Pseudomonas pyocyanea* as extremely pathogenic for man and animals. Lartigau[6] isolated this organism in an outbreak of epidemic dysentery limited to fifteen persons. In four of these cases the disease proved fatal. In a few instances the infection was associated either with *Bacillus coli communis* or with *Bacillus proteus vulgaris*. The source of the infection was found to be the water supply. A fatal case of pyocyanea infection secondary to staphylococcemia was reported by Brill and Libman.[3] In this case the organism could be obtained from the blood-stream during life. *Pseudomonas pyocyanea* is quite common in otitis media (Valentine[8]) and has been obtained in pure and mixed cultures from these cases. Blumer[2] pointed out that this saprophytic organism which is so frequently pathogenic may simulate the action of diphtheria organisms by producing membranous angina. The organism has been isolated by Ernst[4] from a case of pericarditis in which it was associated with the bacillus of tuberculosis. Furthermore, Birch and Benner[1] assigned *Pseudomonas pyocyanea* a rôle in the production of pneumonia in young swine. In this instance it occurred in swine that had been immunized against hog cholera. The chief symptoms were: dyspnea, purulent nasal discharge, lacrimation, and a slight purulent discharge from the eyes. Attempts to reproduce the disease by feeding, inhalation, subcutaneous and intravenous injections, or by direct contact were complete failures. In some cases paralysis of the hind limbs followed large intravenous doses of cultures of bouillon, but such injections failed to produce death.

Pickens, Welsh and Poelma[7] reported on recurring mastitis in cattle due to *Pseudomonas aeruginosa*. The source of the infection was not determined and the disease could not be reproduced

experimentally. The cases were not fatal but the disease recurred, involving one or two quarters of the udder each time. Cows that were or had been infected agglutinated *Pseudomonas pyocyanea* in dilutions as high as 1:1,000, whereas uninfected cows agglutinated the organism in a dilution of 1:25, and partial agglutination occurred at a dilution of 1:50. Some of the calves from the affected herd had fatal diarrhea which was believed to be identical with the so-called pyocyaneus bacillosis of Poels. The strain of pyocyanea isolated from the cases lost its pathogenicity after being cultivated on artificial media four or five weeks. Felton and Wegefarth[5] reported a series of experiments in which dilutions of 1:10 of *Pseudomonas pyocyanea* were injected into the subarachnoid space of cats. Marked purulent meningitis resulted in six of eight cats injected. In higher dilutions results were less certain. Two animals received 1 cc of a 1:50 dilution; one died in twenty-four hours, and the other recovered spontaneously after the development of acute meningitis. The virulence of the organism increased by animal passage until 1 cc of a 1:10,000 dilution of a 24-hour broth culture produced fatal meningitis. In all acute fatal cases of meningitis produced by subarachnoid injection, every culture of heart-blood showed the presence of the organism. When fatal meningitis did not occur in from 24 to 48 hours, the animals would sometimes die in from one to three weeks. The cases appeared to fall in two groups: acute infection and chronic infection, with production of septicemia in both.

These citations from the literature show that *Pseudomonas pyocyanea* is implicated in a wide variety of disorders affecting man and animals, and that this organism may be extremely pathogenic for man and animals. As far as we are aware, this is the first record of *Pseudomonas pyocyanea* being implicated in a disease of fowls. It is worthy of note that among the reports just cited, in which the organism might be suspected of being the cause, all attempts to reproduce the disease experimentally by using the organism resulted in failure. In the light of the evidence accumulated up to the present time, it seems that *Pseudomonas pyocyanea* is more frequently pathogenic when associated with other organisms than when recovered from infected animals in pure culture.

Although the reports we have cited from the literature record failure in the experimental production of the disease in certain animals, we were successful in reproducing the typical symptoms

in one chick. The fact that more of the chicks injected experimentally did not follow the typical course of the disease may be due to any one of a number of factors or a combination of several conditions. In any set of experiments it is difficult to provide all the significant factors. As has been pointed out, the age of the chick influences greatly its susceptibility. Adults were unaffected by a dose nearly three times that sufficient to kill a chick eight weeks old. Whether this is an example of the phenomenon known as "age resistance" or immunity acquired by previous infection, we are unable to say. However, the youngest chick used in our series was the one in which the typical syndrome developed. Further work is in progress and we hope to determine definitely the rôle of age in the etiology of this disease.

That meningitis was observed in the chicks infected experimentally, but not in the spontaneous cases, calls for consideration. Almost without exception the chicks in the latter group came to necropsy after the disease had run its course. It may well be that meningitis is a characteristic of the disease in its early stages, but the chicks had recovered from this condition some time before they succumbed. On the other hand, meningitis may be present only in acute forms of the disease or in cases of a fulminating infection. However this may be, we can state definitely that the terminal stage is characterized solely by clearly defined septicemia.

We are unable to explain how the organisms gain entrance to the chicks. In young birds, six to eight weeks old, repeated feeding of cultures of the organism failed to produce any symptoms whatsoever. The fact that the chicks were taken with a "cold" just before the more pronounced symptoms appeared is strongly suggestive that the respiratory system may act as the portal of entry. It is difficult to state whether the infection followed the respiratory disturbance or whether the infection produced it.

Summary

Pseudomonas pyocyanea may cause a variety of diseases in man and animals. Many have reported this organism in cases in which it was associated with *Bacillus coli communis, Bacillus proteus vulgaris* or staphylococcus and are of the opinion that *Pseudomonas pyocaynea* is more virulent when found in this connection. Lartigau concluded that clincical evidence shows that *Pseudomonas pyocyanea* is relatively more common as a secondary invader and, furthermore, that age is a predominating factor.

Infection, however, is not confined to children. It has been shown that *Pseudomonas pyocyanea* may at times be pathogenic for cattle and hogs.

The epizoötic we have reported was limited to a flock of 400 young chicks; 25 per cent of these recovered from the disease. A slender Gram-negative rod which we believe to be *Pseudomonas pyocyanea* was isolated from 95 per cent of the fatal cases studied. The lesion of the disease was that of acute septicemia except in the chicks that were given experimental injections, in some of which there was microscopic and gross evidence of meningitis. Chicks were taken from the flock that had passed through the disease, for the purpose of testing the agglutinating titre of their serum against *Pseudomonas pyocyanea*. Approximately 50 per cent of those tested gave complete agglutination in dilutions up to 1:100. Agglutination tests on normal chicks were negative.

The gross pathologic changes consisted of congestion of all the viscera, whereas microscopically in some cases there were a few areas of coagulation necrosis. The microscopic lesions of the injected chicks differed from those of spontaneous cases in that there was evidence of meningitis in some of the former.

The pathogenicity of the organism isolated was varied and was appreciably reduced by cultivation on artificial media for a period of three or four weeks. Injection of the organism intravenously into rabbits caused paralysis and death; injections into chicks by the same method resulted in septicemia and in some cases encephalitis.

All attempts to reproduce the disease in chickens by feeding, inhalation or by direct contact, were unsuccessful. Experimental reproduction of the disease by injecting the organism intravenously was not highly successful. Older fowls seemed to be highly resistant to the infection.

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THE SUSCEPTIBILITY OF THE TURKEY, PIGEON, PHEASANT, DUCK AND GOOSE TO BRUCELLA DISEASE*

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A previous paper[1] reported on the pathogenicity of the species of the genus Brucella for the fowl. In view of the fact that the fowl proved readily susceptible to infection by organisms of this genus, it was decided to determine the susceptibility of the turkey, pigeon, pheasant, duck and goose to organisms of this group. This seems important not only from the standpoint that disease may be produced in these birds but also from the fact that in some instances they may, if they are susceptible to this infection, have some importance as a source of infection to both man and animal.

Only one reference can be found in the literature concerning attempts to produce disease in any of the above mentioned birds by exposure to the species of the genus Brucella. Koegel,[2] in 1923, made an attempt to determine the susceptibility of pigeons, as well as fowls, to *Brucella abortus* (Bang) infection. He was unable to produce any outward manifestations of infection by means of various injection routes or by feeding large doses of the organism. During the time of observation, which was from 2 to 4 months, he found agglutinins present in the blood of the birds in titres varying from 1:200 to 1:1000. There was a tendency for the agglutination titre to drop as the time after exposure increased. He was unable to isolate the organism from either the pigeons or the fowls.

PROCEDURE

The birds of each species in these experiments were grouped as outlined in the accompanying tables. The same three strains of the species of the genus Brucella were used as the infective agent in all species of birds. These strains were chosen with no regard to their previous pathogenicity for man, animal or fowl. The strain of *Br. abortus* (Bang) was isolated by Dr. I. Forest Huddleson, Michigan Agricultural Experiment Station, in February, 1920, from the udder of a cow. The strain of *Br. melitensis* was

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received at this station in May, 1921, from Dr. K. F. Meyer, Hooper Foundation for Medical Research, University of California, and was his original strain 11. The strain of *Br. suis* (Traum) was received in May, 1928, from Dr. A. V. Hardy, Iowa State Board of Health, with no record as to the date of isolation.

A physiological salt solution suspension of the organisms from one liver infusion agar slant, incubated for 72 hours, was placed in the drinking water of each bird exposed by the oral route. Birds exposed by injection received 1 cc of a physiological salt solution suspension intravenously. Each species of bird was caged separately, but birds of the same species similarly exposed were caged together.

The agglutination titres of the birds were determined twice a week for two weeks, after which they were tested but once a week. The rapid method of Huddleson and Abell[3] was used in all of the agglutination tests of the birds experimentally exposed. Some of the birds in each group were killed at various intervals in order to study the progress of the disease. At autopsy gentian-violet-liver-infusion-agar plates were smeared and incubated aerobically for three days, after which they were placed in a jar containing ten per cent carbon dioxid and incubated for five days. In all cases in which the causative organism was isolated it was properly identified, typed and found to belong to the original species which was fed that particular bird as an infective agent.

Controls throughout the course of these experiments gave a negative agglutination test and failed to show any macroscopic or microscopic lesions of such a character as might be due to the causative organisms.

Experimental Data

Turkey: The symptoms produced in the turkey were paleness about the head and wattles, diarrhea and emaciation. In the late stages of the disease the birds became very weak, with ruffled feathers and drooping wings. The turkeys which died weighed from 5 to 7 pounds, whereas they weighed an average of 11 pounds when put on experiment. The course of the disease ranged from 80 to 119 days.

The agglutination titres of these birds became positive in 3 to 7 days and, after reaching the peak, declined and became negative in 25 to 60 days.

The macroscopic lesions of the disease are of such a nature that an accurate diagnosis based entirely upon them is extremely

difficult. Early in the course of the disease the spleen became enlarged and congested. At death there was marked atrophy of this organ. It was also usually pale and in one instance showed grey foci on the surface. The liver usually became mottled. Occasionally small gray foci were present, especially upon the cut surface of this organ and in the early stages of the disease. In the later stages the organ became extremely friable. Except for a slight paleness or congestion and enlargement no change occurred in the kidneys. The lungs appeared normal. Necrotic enteritis prevailed in the intestines, the walls of which were usually thickened. Occasionally the mucosa was hemorrhagic and showed areas of almost complete necrosis of the mucous membrane.

TABLE I—*Experiments with turkeys*

Bird	Method of Infection	Species of Brucella	Agglutination Titre			Outcome of Exposure		Organism Isolated from
			Appearance (in Days)	Peak of Titre	Disappearance (in Days)	Died or Killed	Days	
59	Oral (in water)	*Br. suis*	3	1–500	42	D.	80	Negative
305			3	1–200	35	D.	89	Negative
188		*Br. abortus*	3	1–400	42	D.	86	Negative
345			7	1–100	25	K.	60	Negative
1017		*Br. melitensis*	7	1–200	60	D.	119	Negative
288			3	1–200	42	K.	42	Liver; spleen
42	Controls	None		Neg.		K.	120	Negative
45								

The microscopic lesions produced in all of the experimentally infected turkeys were very similar. The spleen always contained perivascular foci of hyperplasia of histiocytes which were usually more numerous near the capsule of the organ. Marked congestion occurred between these foci, especially in the early stages of the disease. Perivascular foci of hyperplasia of histiocytes occurred in the liver in conjunction with the interlobular vessels. Small foci occurred in fewer number within the lobules. All of these foci were larger and more numerous during the earlier stages of the disease. General cloudy swelling of the liver cells occurred early and gave way to hydropic degeneration as the disease progressed. Focal necrosis was of common occurrence. Small foci of hyperplasia of histiocytes generally occurred in the necks or at the bases of the prominences of tissue which contain the

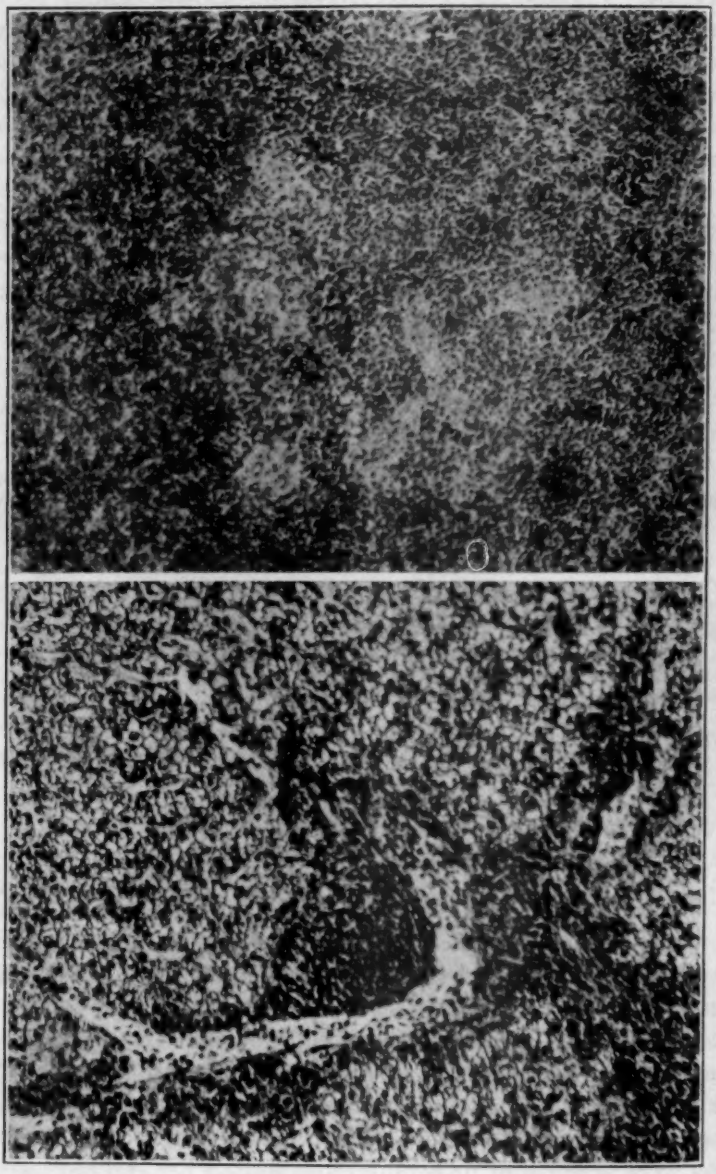

FIG. 1. (Above) Perivascular foci of hyperplasia of histiocytes in the spleen of goose 173. x 225.
FIG. 2. (Below) Perivascular foci of hyperplasia of histiocytes and hydropic degeneration in the liver of pigeon 7. x 425.

bands of smooth muscle in the small bronchioles. Occasionally large foci developed here, and there was often extension of the foci through the alveolar walls towards the periphery of the lobule. Slight focal necrosis and the presence of an exudate in the alveoli usually occurred in such instances. A few large foci of hyperplasia of histiocytes and lymphoid infiltration occurred in the submucosa of the bronchi. The lungs were generally in a very marked state of congestion, especially so in the vicinity of lesions. The tubular epithelium of the kidneys was in a state of cloudy swelling, intermingled with necrosis, the latter tending to prevail at death. Usually many glomerular tufts were hyperplastic. Very few intertubular foci occurred. Necrotic enteritis and congestion were present in the intestinal mucosa. Foci of hyperplasia of reticulo-endothelial cells and lymphoid infiltration occurred in the mucous membrane. These foci often extended into the villi and in such instances tended to become diffuse.

Pigeon: Very few symptoms were produced in the pigeon. Several showed a diarrhea shortly after exposure and bird 7 showed slightly ruffled feathers at the peak of the agglutination titre. None of the birds died and those remaining at 120 days were killed for histopathological and bacteriological study.

TABLE II—*Experiments with pigeons*

Bird	Method of Infection	Species of Brucella	Agglutination Titre			Outcome of Exposure		Organism Isolated from
			Appearance (in Days)	Peak of Titre	Disappearance (in Days)	Died or Killed	Days	
2	Intravenous	*Br. abortus*	14	1–400		K.	60	Negative
3			7	1–500		K.	30	Spleen
6	Oral (in water)	*Br. abortus*	3	1–400	89	K.	120	Negative
7			7	1–400	29	K.	120	Negative
8		*Br. melitensis*		Neg.		K.	90	Negative
9			7	1–25	14	K.	120	Negative
10		*Br. suis*		Neg.		K.	90	Negative
11			14	1–25	21	K.	120	Negative
4	Controls	None		Neg.		K.	120	Negative
5								

These birds showed considerable variation in their ability to produce specific agglutinins. The series of agglutination titres obtained from the blood serum of bird 2 was of extreme interest.

On the fourteenth day after exposure, this bird had an agglutination titre of 1:25. The next week it was negative and it continued to fluctuate each week until the 49th day, when an agglutination titre of 1:400 was developed. Two birds failed entirely to produce specific agglutinins.

The macroscopic lesions shown by these birds were very similar to those shown by the turkey, except that they were much less extensive. Enlargement of the spleen was usually very marked as also were the intestinal lesions. Some birds showed the presence of old petechiae on the liver. The birds were all in excellent flesh throughout the course of the experiment.

The microscopic lesions found in these birds were so essentially like those found in the turkey that they will not be described. All of the exposed pigeons, even those showing a negative agglutination titre, had lesions in all of their organs studied. In most instances they were not so extensive as those shown in the turkey and in the majority of those autopsied at 120 days evidences of healing were present, especially in the liver.

Pheasant: None of these birds showed any symptoms of disease whatsoever and all remained in excellent physical condition throughout the course of the experiment. The rise and decline of the agglutination titres, in a general way, were similar to those of the turkey. Bird 17 was an exception, however, as the agglutination titre of this bird remained 1:500 during the last eighty days of the experiment.

TABLE III—*Experiments with pheasants*

Bird	Method of Infection	Species of Brucella	Agglutination Titre			Outcome of Exposure		Organism Isolated from
			Appearance (in Days)	Peak of Titre	Disappearance (in Days)	Died or Killed	Days	
16	Oral (in water)	*Br. melitensis*	7	1–200	49	K.	90	Negative
15			10	1–200	56	K.	120	Negative
14		*Br. suis*	10	1–400	42	K.	120	Negative
17			7	1–500		K.	120	Spleen: kidney; liver
18		*Br. abortus*	10	1–25	17	K.	60	Negative
19			10	1–50	24	K.	120	Negative
20	Control	None		Neg.		K.	120	Negative

The spleens of these birds were usually slightly enlarged and often pale. This organ in one bird contained large gray foci. The

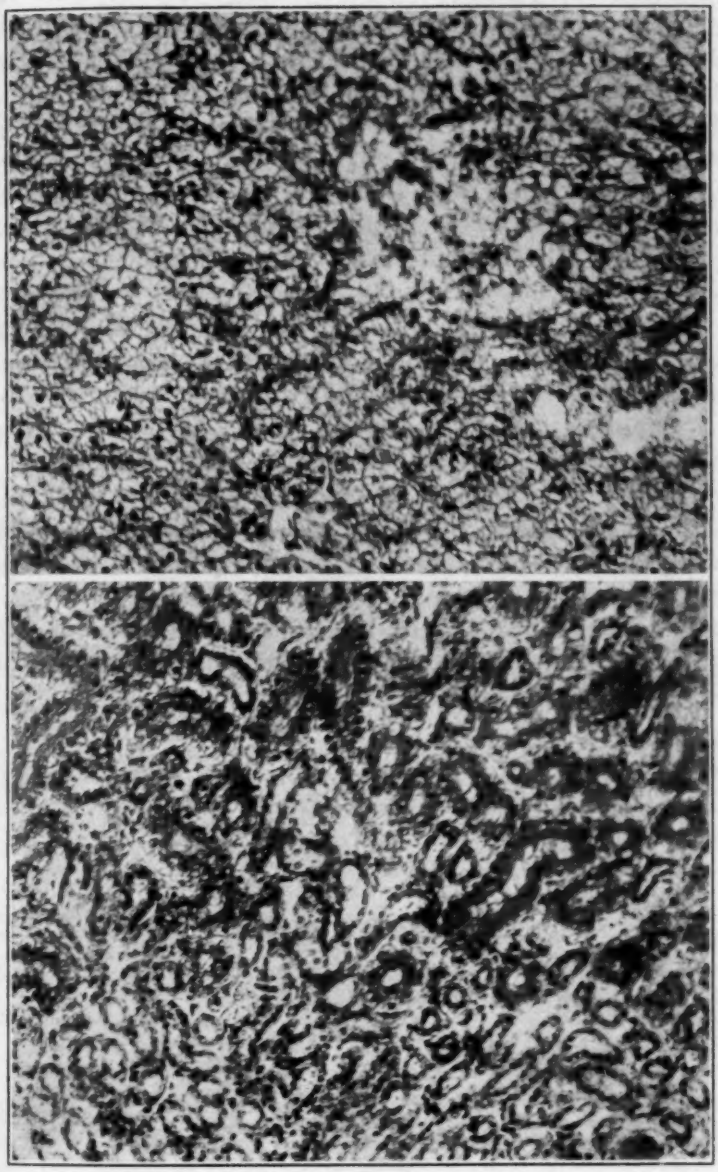

FIG. 3. (Above) Focal necrosis and hydropic degeneration in the liver of turkey 59. x 425.
FIG. 4. (Below) Cloudy swelling intermingled with necrosis of the tubular epithelium of the kidney of goose 66. x 425.

liver was often mottled and in a few instances was very pale. The lungs were normal. The kidneys often showed congestion or paleness but with no change in size. Necrotic enteritis was rather marked in all of the birds except those autopsied a considerable length of time after the decline of the agglutination titre.

Microscopic lesions were essentially of the same character as those found in the turkey. Although the disease failed to be fatal or to produce any apparent outward effect upon the birds, microscopic lesions in all of the birds were quite marked.

Duck: Only one symptom of disease manifested itself in the duck. That was an increased respiration, somewhat dyspneic and usually accompanied by slight rattling or wheezing sounds. This symptom could be observed most readily when the ducks were quiet and was present in nearly all of the birds.

The duck showed a variable ability to produce specific agglutinins. Ducks injected intravenously with a suspension of the causal organism developed an agglutination titre of 1:500 in three days. However, only one duck exposed orally developed an agglutination titre above 1:100 and three failed entirely to produce agglutinins. Duck 33, although negative to the agglutination test for 30 days, finally developed a titre of 1:400.

TABLE IV—*Experiments with ducks*

Bird	Method of Infection	Species of Brucella	Agglutination Titre			Outcome of Exposure		Organism Isolated from
			Disappearance (in Days)	Peak of Titre	Appearance (in Days)	Died or Killed	Days	
26	Intravenous	*Br. suis*	3	1–500		K.	30	All organs
27		*Br. melit.*	3	1–500		K.	60	Liver; spleen
28		*Br. abort.*	3	1–500		K.	90	Negative
29	Oral (in water)	*Br. suis*	3	1–100	21	K.	120	Negative
30			7	1–25	14	K.	90	Negative
31				Neg.		K.	60	Negative
32		*Br. abortus*	7	1–50	21	K.	60	Negative
33			30	1–400	90	K.	120	Negative
34				Neg.		K.	90	Negative
35		*Br. melitensis*	14	1–25	21	K.	30	Negative
36			3	1–50	21	K.	60	Negative
37				Neg.		K.	120	Negative
38	Control	None		Neg.		K.	120	Negative

On autopsy the ducks invariably showed an enlarged and congested spleen. The organ was very firm, with flat surfaces, the latter probably due to pressure from the surrounding organs. Fibrinous pericarditis was of frequent occurrence in many of the ducks. The liver usually appeared mottled and pale but never friable. Occasionally gray or light brown foci appeared upon its surface. The kidneys were generally slightly enlarged and pale but occasionally appeared congested. Necrotic enteritis, especially in the duodenum, and occasionally hemorrhagic enteritis were found in the intestines. Only the duodenal portion of the intestines appeared affected in most instances.

The microscopic lesions were essentially the same as those found in the turkey. It is interesting to note that all of the ducks, even those showing a negative agglutination titre, showed microscopic lesions of the disease. The ducks showed extremely marked lesions in the lungs, always much more extensive than those found in the lungs of any of the other birds. Very large foci occurred in the submucosa of the bronchi, while the bronchiolar lesion often extended to involve the entire lobule. Considerable exudate was present in the adjacent alveoli. These lesions in the lungs of ducks no doubt account for the presence of the symptom previously mentioned.

Goose: The reaction of the goose to the causal organisms was very similar to that of the duck. The respiratory symptom was usually present. No birds developed an agglutination titre above 1:100 and two birds failed entirely to develop specific agglutinins.

TABLE V—*Experiments with geese*

Bird	Method of Infection	Species of Brucella	Agglutination Titre			Outcome of Exposure		Organism Isolated from
			Appearance (in Days)	Peak of Titre	Disappearance (in Days)	Died or Killed	Days	
59	Oral (in water)	*Br. suis*	7	1–100		K.	14	Spleen; kidney
173			3	1–25	14	K.	90	Negative
60		*Br. abortus*		Neg.		K.	60	Negative
62			14	1–50	30	K.	90	Negative
65		*Br. melitensis*	7	1–25	21	K.	90	Negative
66				Neg.		K.	60	Negative
68	Controls	None		Neg.		K.	120	Negative

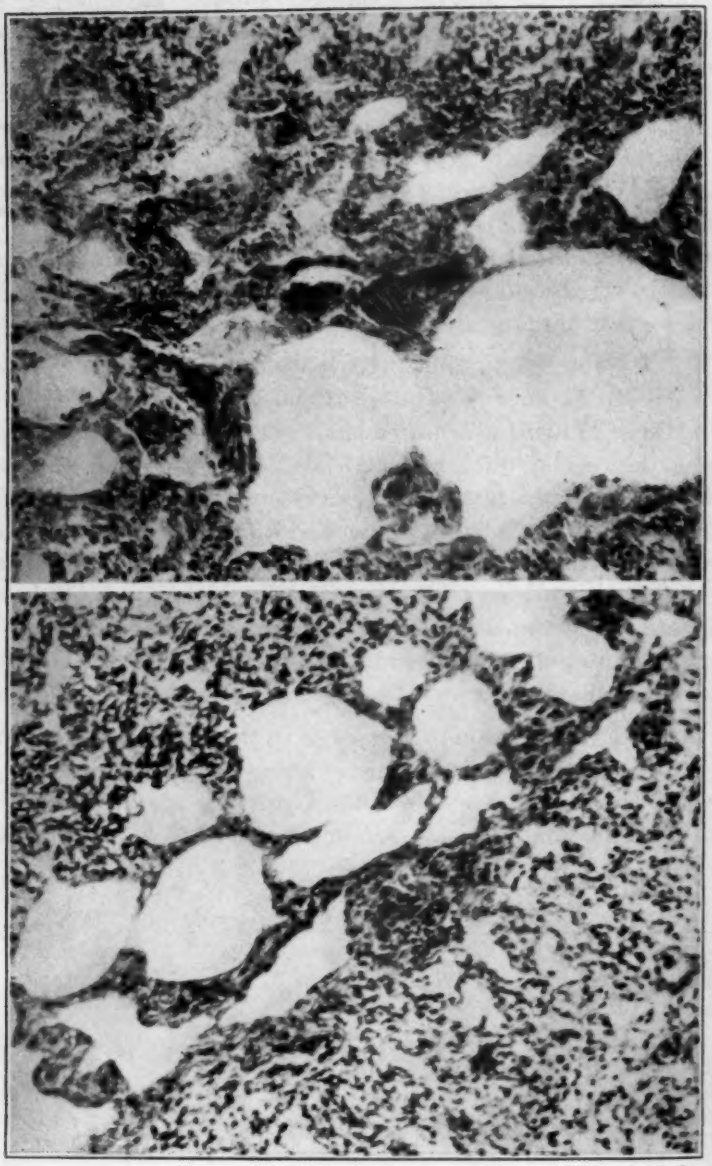

FIG. 5. (Above) Type of lesion often seen along bronchioles. (Duck 35.) x 425.
FIG. 6. (Below) Foci of hyperplasia of histiocytes along bronchioles. (Pheasant 16.) x 425.

The macroscopic and microscopic lesions found in all of these birds were so essentially the same in character as those found in the duck that they will not be described.

Discussion

The symptoms and course of the disease produced in the turkey by exposure to the species of the genus Brucella are very similar to those previously reported as occurring in the fowl.[1] The disease, however, is more prolonged in the turkey. With the exception of two turkeys killed early in the experiment, the disease was fatal in 80 to 119 days.

The agglutination titres of the turkey and pheasant, as well as the fowl, were very similar in that practically all birds developed specific agglutinins and with few exceptions all titres ascended and then, after reaching the peak, descended to become negative, to remain so. From 38 to 63 days elapsed between a negative agglutination titre and death in the turkey. The disease in the pheasant, however, failed to be fatal. These birds never showed any symptoms of disease and were in excellent flesh at the conclusion of the experiment. This was true of bird 17, even though its blood serum showed a titre of 1:500 during the last eighty days of the experiment. All of the pheasants, however, showed microscopic lesions of the disease.

On the other hand, the pigeon, duck and goose showed considerable variation in their ability to produce specific agglutinins, many failing to do so when exposed by the oral route. But very few symptoms were shown by these birds. However, all of them showed microscopic lesions essentially the same in character as those found in the turkey. In some instances these birds, especially the pigeon, showed a tendency on the part of injured tissues to repair.

The same difficulty in isolating the causal organism was experienced in all of these birds as was experienced in the fowl. The longer the period that elapsed between exposure and autopsy, the more difficult it was to isolate the organism. It appears that the life of the organism in birds may be of short duration and that the progression of lesions is due to the presence of toxic substances.

Although the presence of the causative organism has never been demonstrated in the feces of the pigeon and pheasant, it would not be surprising to learn that infected birds may be proved to be a source or carriers of infection. Considerable opportunity

is offered these birds to feed in lots occupied by infected animals and their more or less roaming nature, especially the pheasant, readily provides a means by which Brucella infection could easily be carried.

Judging from the reaction of all of the birds to experimental infection, it appears that the same strain of the species of the genus Brucella differs somewhat in its pathogenicity for some species of birds. The blood of pheasants exposed to *Br. suis*, and of pigeons exposed to *Br. abortus*, gave a much higher agglutination titre than the blood of birds of the same species exposed to other species of this genus. The microscopic lesions of these birds were also much more pronounced. The variation in pathogenicity of the species of the genus Brucella is brought out possibly more strikingly by Huddleson and Hallman,[4] in their work with the monkey.

It was observed also that these organisms in some instances may be more selective for various organs. This is suggested by the fact that the microscopic lesions found in the lungs of the duck and goose were much more pronounced and extensive than in any bird heretofore studied when exposed to the same infection.

Conclusions

1. In these experiments the turkey, pigeon, pheasant, duck and goose appear to be susceptible to infection by the species of the genus Brucella when fed massive doses. The disease was fatal in the turkey only—80 to 119 days.

2. Symptoms of the disease in the turkey were paleness about the head and wattles, diarrhea and emaciation. Very few symptoms appeared in the remaining birds.

3. The turkey and the pheasant consistently developed specific agglutinins. The pigeon, duck and goose exhibited a varying ability to produce specific agglutinins, especially when exposed by the oral route.

4. Perivascular foci of hyperplasia of histiocytes with congestion of the spleen, foci of hyperplasia of histiocytes with hydropic degeneration and focal necrosis in the liver, foci of hyperplasia of histiocytes along the bronchioles, often with extension into the adjacent lobule, and cloudy swelling intermingled with necrosis of the tubular epithelium of the kidneys, usually accompanied by hyperplasia of many of the glomerular tufts, were the principal microscopic lesions shown in the organs of all exposed birds.

ACKNOWLEDGMENT

The author wishes to thank Hon. P. S. Lovejoy, Michigan State Department of Conservation, for his courtesy in providing the pheasants used in these experiments, and also Mr. J. M. Moore, Poultry Department of Michigan State College, whose kind cooperation made these experiments possible.

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"X-Rayed" Animals Reveal Tuberculosis

Artists, mechanics and veterinarians of the U. S. Department of Agriculture have collaborated in developing an exhibit which, by an unusual optical effect, portrays the effects of tuberculosis on cattle, swine and poultry. This ingenious mechanical exhibit is in the form of a panel, 14 feet long, 4 feet high and 5 feet deep. The spectator first sees what appears to be almost life-size photographs of a cow, a hog and a chicken. A series of electric lights in front of the panel illuminates it strongly with a foot-light effect. Then to the astonishment of observers, the exhibit assumes an entirely different appearance. Automatic "flashers" turn off the lights in front and turn on lights in the rear of the panel. The observer then views, as though by X-ray, the internal organs of the animals and is able to note tuberculous conditions in the form of nodules and other lesions in vital organs.

"The X-ray effect, although actually no real X-rays are involved, is the best means we have ever had of showing the people where the lesions of tuberculosis are located," explains Dr. A. E. Wight, who is in charge of tuberculosis eradication for the U. S. Bureau of Animal Industry. "Not only does it show the location of the diseased organs, but the lesions as well as the organs are pictured in their natural colors. The flashing of the lights also helps to attract the visitors to the exhibit."

The display has been one of the features of interest at recent tuberculosis conferences in Cedar Rapids, Iowa, and Albany, N. Y. This unusual exhibit was planned by Dr. Elmer Lash, of the Tuberculosis Eradication Division, in conjunction with R. S. Allen, exhibit specialist, and J. H. Stevenson, chief illustrator of the Department of Agriculture.

A STUDY OF THE LEUCOCYTE CHANGES IN THE BLOOD OF DISEASED SWINE

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During the past year the significance of porcine leucopenia has been studied at the Illinois Agricultural Experiment Station in conjunction with established procedures in the diagnosis of swine diseases. In practically all cases the pigs originated in herds that suffered from a clinically obscure disease and a laboratory diagnosis was sought by the clinician. A clinical and autopsy diagnosis was made on forty-one pigs and a study of these findings was checked with a leucocyte count.

Lewis and Shope,[1] of the Rockefeller Institute, first called attention to the possible significance of the white-cell count as a diagnostic aid in obscure cases of hog cholera infection. They tentatively concluded, in part, from their preliminary studies:

> It would appear that hog cholera is the only acute infectious swine disease characterized by a decrease in the number of white blood-cells. This leucopenia is of such a profound degree as to be of diagnostic importance. It is believed by us that for the present and until contradictory evidence appears, a leucocyte count of 8,000 per cu. mm. or less on three sick animals in a suspected herd indicates clearly that the condition is hog cholera.

COLLECTION OF BLOOD SPECIMENS

In our studies, the symptoms of the animals submitted for diagnosis were carefully noted, after which a small amount of blood (2.5 cc) was collected from the brachial artery in a sterile vial containing 5 mg. of finely powdered sodium oxalate. Standard methods were used in making the counts, 3 per cent glacial acetic acid and Toison's fluid being used for diluting the white and red blood-cells, respectively. Following the collection of the blood sample, each animal was immediately autopsied.

A summary of the results of the red and white blood-cell counts and the gross pathologic diagnosis in each animal (see table I) suggests that even though such complications as hemorrhagic septicemia, infectious enteritis, and ascariasis co-existed with hog cholera infection, leucopenia was encountered in a majority of cases which showed lesions of hog cholera. However, hog

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TABLE I—*Pathologic diagnosis and blood count*

SPECIMEN		PATHOLOGIC DIAGNOSIS	BLOOD COUNT		FINAL DIAGNOSIS
			W.B.C.*	R.B.C.*	
1	402	*Mestastrongylus apri.* *Trichuris suis.* *Macrocanthorhynchus hirudinaceus.* Necrotic enteritis	8,550	2,900,000	Parasitism. Necrotic enteritis
2	454	Ascariasis. *Macrocanthorhynchus hirudinaceus.* Lesions of hog cholera	7,500	5,550,000	Parasitism. Hog cholera
3	455		5,200	4,700,000	
4	913	Ascariasis. *Macrocanthorhynchus hirudinaceus.* Pneumonia. Necrotic enteritis. Influenza	4,925	3,960,000	Parasitism. Hog cholera. Pneumonia. Susp. influenza Necrotic enteritis
5	996	Ascariasis. *Trichuris suis.* Pneumonia.	3,125	2,850,000	Parasitism. Pneumonia. Hog cholera
6	997	Lesions of hog cholera	5,000	3,700,000	
7	1698	Ascariasis. *Metastrongylus apri.* Lesions of hog cholera	6,700	1,610,000	Parasitism. Hog cholera
8	1699		5,310	2,400,000	
9	1700		3,800	2,640,000	
10	1701		4,200	2,110,000	
11	1927	Pneumonia. Lesions of hog cholera	14,250	3,870,000	Pneumonia. Hog cholera
12	1936	Bilateral pneumonia. Gastritis (mineral mixture)	19,050	1,910,000	Pneumonia. Gastritis
13	3044	Lesions of hog cholera	3,350	3,950,000	Hog cholera
14	3120	Ascariasis. Pneumonia	13,250	3,620,000	Parasitism. Pneumonia
15	3217	Ascariasis. *Trichuris suis.* Bilateral pneumonia	9,300	3,000,000	Parasitism. Pneumonia. Influenza (suggested)
16	3218		8,500	2,900,000	
17	3219	Lesions of hog cholera	8,350	2,410,000	Hog cholera
18	3343	Ascariasis. *Macrocanthorhynchus hirudinaceus.* Acute edematous bronchitis	14,600	3,220,000	Parasitism. Influenza. Possibility of hog cholera
19	3344		4,400	4,310,000	
20	3603	Suspicious lesions of hog cholera	15,100	6,210,000	Possiblity of hog cholera

TABLE I—*Continued*

Specimen		Pathologic Diagnosis	Blood Count		Final Diagnosis
			W.B.C.*	R.B.C.*	
21	3665	Lesions of an acute bacterial infection	19,150	4,250,000	Hemorrhagic septicemia
22	3666		19,800	3,530,000	
23	3669	Ascariasis. *Metastrongylus apri.* Pneumonia.	2,500	1,920,000	Parasitism. Pneumonia.
24	3670	Necrotic enteritis. Lesions of hog cholera	17,700	2,720,000	Necrotic enteritis
25	3671	*Trichuris suis.* Necrotic enteritis. Hemorrhagic septicemia. Hog cholera	3,800	2,690,000	Parasitism. Necrotic enteritis. Hemorrhagic septicemia. Hog cholera
26	3872	*Trichuris suis.* Pneumonia. Necrotic enteritis. Suggestive lesions of hog cholera	19,750	5,030,000	Parasitism. Pneumonia. Necrotic enteritis. Hog cholera (susp.)
27	4000	Lesions of hog cholera	3,850	3,730,000	Hog cholera
28	4230	Lesions of hog cholera	5,600	1,970,000	Hog cholera
29	4254	Emaciation	14,700	3,450,000	Starvation
30	4256	Lesions of hog cholera	22,500	2,370,000	Hog cholera
31	4446	Pneumonia. Lesions of hog cholera	2,800	4,120,000	Pneumonia. Hog cholera
32	4447		4,800	3,550,000	
33	4789	*Metastrongylus apri.* Ascariasis	11,250	2,680,000	Parasitism
34	4838	Necrotic enteritis	15,750	4,800,000	Necrotic enteritis
35	5094	Pneumonia.	9,500	5,670,000	Pneumonia.
36	5095	Abscesses in lungs	16,100	5,880,000	Abscesses in lungs
37	5189	Pneumonia. Lesions of hog cholera	2,700	6,320,000	Pneumonia. Hog cholera
38	5234	*Metastrongylus apri.* Ascariasis. Lesions of low-grade hog cholera	3,700	3,870,000	Parasitism. Hog cholera
39	7280	Ascariasis. Pneumonia. Lesions of hog cholera	3,800	4,670,000	Parasitism. Pneumoniaa Hog choler.

TABLE I—*Continued*

SPECIMEN		PATHOLOGIC DIAGNOSIS	BLOOD COUNT		FINAL DIAGNOSIS
			W.B.C.*	R.B.C.*	
40	9096	Ascariasis. *Metastrongylus apri.* Pneumonia	24,500	4,600,000	Parasitism. Pneumonia
41	9365	Ascariasis. Pneumonia. *Trichuris suis.* Fresh hemorrhages on kidney and bladder	17,400	2,640,000	Parasitism. Pneumonia. Influenza

*W. B. C. Leucocytes.
*R. B. C. Erythrocytes.

cholera complicated with pneumonia was occasionally associated with a leucocytosis. In acute edematous bronchitis, or "flu," a distinct leucopenia also was encountered. Likewise, a white-cell count in these cases failed to differentiate hog cholera from acute edematous bronchitis or "flu" in swine, yet the history and autopsy lesions suffice to distinguish these two diseases in most cases. No significant variation in the number of red cells was noted in the different diseases.

Hog cholera: Twenty-seven (66 per cent) of the forty-one specimens examined according to history, symptoms and gross lesions were regarded as hog cholera. The average leucocyte count of the 27 cases in which hog cholera lesions were detected was 7,300 per cu. mm., while the average leucocyte count for five cases diagnosed as uncomplicated hog cholera was 8,700 per cu. mm. The number of white cells may seem rather high in the light of the suggestion of Lewis and Shope, that a maximum of 8,000 leucocytes per cu. mm. was considered indicative of hog cholera virus infection. However, one of the five pathologically diagnosed, uncomplicated cases showed a leucocyte count of 22,500 per cu. mm. The gross postmortem lesions of this animal were quite indistinguishable from hog cholera infection, yet the leucocytosis encountered tends to support the contention that there may be occasional discrepancies between the white-cell count and lesions indistinguishable from cholera.

Gross lesions of complicated hog cholera: Seventeen cases of complicated hog cholera gave an average leucocyte count of 5,600 per cu. mm. Two of these specimens showed a leucocyte count of 14,250 and 17,700 per cu. mm., respectively. Pneumonia complications were present in both pigs. The white-cell

count in each of the fifteen remaining cases of this group was below 8,000 per cu. mm.

Suspicious gross lesions of hog cholera: A suspicious pathologic diagnosis of hog cholera was made in five pigs that showed an average leucocyte count of 11,700 per cu. mm. Out of the five pigs, one, showing gross lesions of pneumonia and enteritis, revealed a leucocyte count of 19,750 per cu. mm. In another case of this group, 15,100 leucocytes per cu. mm. were noted; while the third case, which was suffering from a pneumonia complication, showed a distinct leucopenia (4,925 per cu. mm.); yet the herd history was suggestive of either influenza or hog cholera. In the remaining two specimens of this group, from the same herd, one showed a leucocyte count of 14,600 per cu. mm., while the other showed a distinct leucopenia (4,400 per cu. mm.). At autopsy, parasites were present with suggestive lesions of acute edematous bronchitis and hog cholera.

Acute edematous bronchitis or "flu": Pneumonia, parasites, or lesions suggestive of hog cholera were present in six cases of "flu." Three of the cases in which parasites and suggestive lesions of hog cholera were present showed leucocyte counts of 4,925, 14,600 and 4,400 per cu. mm., respectively. The three other cases that were complicated with parasites and pneumonia gave leucocyte counts of 17,400, 9,300 and 8,500 per cu. mm., respectively. The average leucocyte count for the "flu" group complicated with pneumonia, parasites, and possibly cholera, was 9,800 per cu. mm.

Hemorrhagic septicemia: Two of the three cases of hemorrhagic septicemia were uncomplicated and were accompanied by a leucocytosis (18,150 and 19,900 per cu. mm., respectively). The third case, which was complicated with parasites, pneumonia, infectious enteritis, and gross lesions suggestive of hog cholera, showed a leucocyte count of 3,800 per cu. mm. The average leucocyte count for the three cases was 14,250 per cu. mm.

Miscellaneous diseases. The nine remaining cases were diagnosed as emaciation, parasitism, pneumonia, gastritis, and infectious enteritis. The average leucocyte count for this group was 14,700 per cu. mm.

SUMMARY

The results of comparing the gross pathologic diagnosis with the white-cell count on forty-one obscure cases of swine disease suggest that a leucopenia may occur in hog cholera. Leucopenia

is not, however, an infallible guide in this infection. As a routine procedure in our hands, a certain significance is attached to the presence of leucopenia in connection with history and gross anatomic lesions. Gross pathologic lesions of hog cholera were found in 27 (66 per cent) of the 41 cases studied, while leucopenia prevailed in this group, with an average of 7,700 leucocytes per cu. mm. A distinct leucopenia was encountered in four of the six cases of acute edematous bronchitis or "flu" in swine. Erythrocyte counts failed to disclose significant changes in the blood of the cases examined.

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Texas Ladies' Auxiliary Meets

In spite of heavy rains, the Ladies' Auxiliary to the State Veterinary Medical Association of Texas reported an attendance of about twenty-five members at the meeting held at College Station, June 16-19, 1930.

On Monday evening the lawn about Francis Hall was gayly decorated and a barbecue dinner served to the veterinarians and their wives. Tuesday a luncheon was served in the home of Dr. and Mrs. R. P. Marstellar and the hostess proved herself a delightful entertainer.

Included in Wednesday's entertainment was a trip to the State Prison Farm, at Huntsville, about sixty miles from College Station. Thursday found the ladies being entertained in the home of Dr. and Mrs. A. A. Lenert, where cards and a lovely luncheon were enjoyed.

The business meeting was held in the home of Dr. and Mrs. Francis, at the conclusion of which tea was served, with Mrs. Marstellar assisting the hostess. All officers were re-elected.

MRS. U. E. MARNEY, *Corresponding Secretary*

Course in Tropical Veterinary Medicine

Beginning in October, 1930, there will be held jointly by the University of Edinburgh and the Royal (Dick) Veterinary College, a course for a diploma in Tropical Veterinary Medicine. This course will continue for six months parallel with the curriculum in Tropical Medicine.

ELECTROCARDIOGRAPHIC STUDIES OF DOGS INFESTED WITH DIROFILARIA IMMITIS

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In the laboratories of Physiology and Pharmacology at Tulane University, in New Orleans, a considerable number of dogs are used each year in experiments, both for research and in the routine laboratory work of the students. It is a remarkable observation that when the heart is opened, a number of adult worms (*Dirofilaria immitis*) are frequently found. Generally only a few worms are to be seen, but occasionally there are 15 or 20, or even more. These parasites, varying from 10 to as much as 25 cm. in length, are coiled within the chambers, about the chordae tendinae, or even extend between the valve leaflets from auricle to ventricle. The prevention of proper closure of the valves must, in some instances at least, produce valvular incompetence.

Not all dogs examined are infested. We have no data on this point, but our impression is that worms will be found in the hearts of perhaps 50 per cent of the older dogs of this city. Not only are the adult worms found in the heart, but in many cases the larval worms are present in the blood, and may be seen microscopically.

The life history of this nematode,[1] *Dirofilaria immitis* (Leidy, 1856) Railliet and Henry, 1911, involves mosquitoes as intermediate hosts, the following species having been incriminated: *Anopheles maculipennis, A. bifurcatus, A. algeriensis, Culex fatigans, C. penicillaris, C. vexans, C. pipiens, Myzorhynchus pseudopictus, Stegomyia fasciata* and *Myzomyia superpicta*, and one author has reported the dog flea (*Ctenocephalus canis*) and the cat flea (*Ctenocephalus felis*), but these last two hosts probably should not be cited, since this work has never been verified.

In the dog the embryos escape into the blood and circulate as first-stage larvae. They tend to disappear from the peripheral circulation during the day and reappear at night, as do the larvae of *Wuchereria bancrofti* (*Filaria bancrofti*) of man, the habit in the case of both species being associated with the night-feeding habits of their mosquito hosts. When a mosquito sucks the blood of infested dogs, it takes in the larvae from the blood. These

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larvae pass through the walls of the stomach, and in 24 to 36 hours transform in the malpighian tubules of the mosquito, as a rule, though some pass to other parts of the body. Later they are found in the mouth parts as infective larvae, and they infect dogs when the mosquito bites the dog.

The distribution of this parasite is as follows: United States, especially in the Gulf and Atlantic Coast states, as far north as New Jersey; Hawaii, Europe (Italy, Spain, Denmark, Germany, France and England), Australia, New Caledonia, Fiji Islands, Mauritius, Russian Turkestan, Tunis, Algeria and Surinam. They are especially common in China, Indo-China and Japan.

It is a remarkable fact that the dogs appear perfectly healthy. Apparently it is only when the infestation is heavy that certain dogs will show evidences of circulatory embarrassment after exercise. It occasionally happens also that an experiment animal will die suddenly and unexpectedly under ether anesthesia. Such deaths have been attributed to the presence of the parasites.

How is the circulatory embarrassment brought about? This is a debatable point. It seems possible, where the heart contains many adult worms, that the valvular insufficiency brought about mechanically may be the cause. On the other hand, the larval worms in the blood may prevent free flow of blood through the capillaries. If this partial obstruction occurs in the active skeletal muscles, dyspnea or breathlessness may very possibly result from inadequate oxidation. If obstruction is in the capillaries of the coronary circulation of the heart, the effect will be more direct. Insufficient oxygen to the heart muscle will mean its fatigue and an inability of the heart to pump the normal quantity of blood. A further possibility is hindrance to blood-flow in the capillaries of the lungs. This, of course, would diminish the oxygen supply to the whole body, and retard the elimination of carbon dioxid. But in view of the larger size of the pulmonary capillaries, this is not the probable cause.

Electrocardiography appealed to us as a means of determining whether impairment of the coronary flow was involved. It is well known, from human electrocardiography, that unless there is direct damage of the cardiac muscle, or exhaustion resulting from oxygen lack, the electrocardiogram is normal. Therefore, in view of the fact that the infested dog shows no signs of circulatory embarrassment when at rest, we did not expect to obtain abnormal electrocardiograms from the resting dog.

On the other hand, we thought it quite possible that exercise, if it caused exhaustion of the cardiac muscle, might lead to significant electrocardiographic changes. There is good ground for this expectation. During anginal attacks in man, significant alterations in the electrocardiogram frequently occur.[2] The evidence goes to show that the departures from the normal in these cases are a consequence of partial occlusion of the coronaries and the resulting decrease in oxygen supply to the heart muscle.

Before going on to a description of the experiments, and a presentation of the results, it will be necessary, for the information of those who are unfamiliar with electrocardiography, to give a brief explanation.

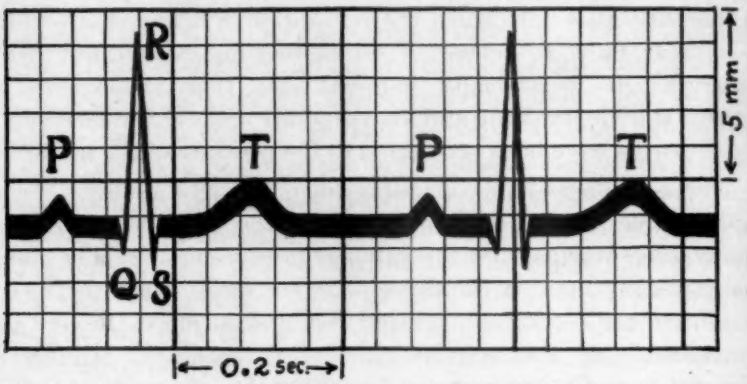


FIG. 1. A drawing accurately representing a normal dog electrocardiogram (two heart beats). (For explanation, see text.)

All active tissues, including cardiac muscle, undergo a fall in electrical potential, as compared with inactive tissues. In the heart the beat originates in the sinus node, a mass of specialized muscle located in the sulcus terminalis near the angle between the superior vena cava and the right auricle. This region becomes electrically negative, as the contraction starts, and then, as the wave of contraction sweeps out from its starting point in all directions through the auricles, the successive muscular regions undergo a fall in potential. The P wave, labelled in figure 1, is the galvanometric record of the invasion of the auricle by the wave of excitation. This wave travels about 1 m/sec.

The pause between the P-wave and the next group of deflections represents the time during which the wave of excitation is making its way (to the ventricle) by a narrow muscular pathway (the atrio-ventricular node and bundle). The Q wave, very inconspicuous or absent, and downwardly directed, the upward

R-wave, and the downward S-wave, also often small or absent, are a consequence of the invasion of the ventricles by the changed electrical state. During that time (about the first half of systole), when both ventricles are equally negative, the string shadow returns to the base line. Then, with the gradual disappearance of negativity, the T wave is inscribed.

The P-R interval (normally about 0.1 sec. in the dog), that time interval from the beginning of the P upstroke to the R upstroke (or Q), is the conduction time. It represents the time required for the wave of excitation or activity to pass from the sinus node to the ventricular muscle. The time required for inscription of the QRS group of deflections is that during which the wave is spreading throughout the ventricles. The Q-T interval (from Q to end of T) is, very roughly, a measure of the time during which the ventricles are in systole or contraction.

There is no electrical change due to relaxation or diastole.

Three separate electrocardiograms are obtained from each dog, as is the practice with the human. One, called lead I, is from the fore-limbs. The wire connections to the galvanometer are so arranged that a movement or trend in the electrical wave through the heart in a direction from right to left will result in an upward deflection. Lead II is derived from the right fore and left hind limbs. A trend in movement of the wave from fore to hind limb again results in an upward deflection; a movement in the opposite direction would, of course, produce a downward deflection. Lead III is from the left fore and left hind limbs. An upward deflection here means that the wave of negativity is traveling in the direction from the fore to the hind limb.

As a necessary consequence of these and of other considerations which space does not permit us to discuss, it results that the electrocardiogram gives information on the following points:

(a) The direction of the main trend of the wave of excitation at each instant during systole. (b) The relative magnitude of the electrical changes at any instant as these changes are projected upon the frontal plane of the body. As a consequence of this latter fact, if the trend of movement were directly backward or forward, no movement of the galvanometer indicator would result. (c) The time required for the wave to pass from place to place, as well as the interval between beats.

Much information may be obtained from a record showing these three things. If the wave of excitation for any recorded beat arises in an abnormal position (as in extra systoles), the

direction in which the wave travels will be abnormal and is so recorded. If the muscle is at any point so defective as to serve as a barrier to the normal passage of the wave, the latter pursues an abnormal pathway, and the electrocardiogram reveals it. If the barrier be in the narrow muscular pathway connecting auricles and ventricles, block results, and is clearly revealed by the abnormal time relationships between auricular and ventricular beats. If the heart is in an abnormal position, the direction of the wave with reference to the leads is abnormal, and the condition is revealed. If any portion of the heart is hypertrophied, the larger mass of muscle produces a larger electrical effect, and the hypertrophy is thus detectable. Of course, since there is a simultaneous time record, any irregularity or arrhythmia is at once apparent.

Finally, we must mention an effect which is most important in connection with the results we have obtained. Damaged or fatigued muscle retains its negative electrical state less constantly

TABLE I—*Electrocardiograms*

DOG	LEAD	HEART RATE	P-R INTERVAL (SECONDS)	AMPLITUDE OF R WAVE (MM.)	DURATION OF QRS (SEC.)	AMPLITUDE OF T WAVE (MM.)
			UNINFESTED			
1	I	58	0.11	6.0	0.05	1.0
	II	58	0.11	24.0	0.05	1.0
	III	58	0.11	18.0	0.05	2.0
2	I	88	0.12	4.0	0.05	0.1
	II	88	0.12	9.5	0.05	1.0
	III	88	0.12	5.5	0.05	0.9
3	I	90	0.10	3.0	0.05	1.0
	II	90	0.10	9.5	0.05	0.5
	III	90	0.10	6.5	0.05	0.5
			INFESTED			
4	I	106	0.10	8.0	0.05	1.0
	II	106	0.10	17.0	0.05	2.0
	III	106	0.10	9.0	0.05	1.0
5	I	91	0.10	2.5	0.04	1.0
	II	91	0.10	12.5	0.04	2.0
	III	91	0.10	10.0	0.04	1.0
6	I	76	0.12	5.5	0.05	0.0
	II	76	0.12	9.5	0.05	0.5
	III	76	0.12	4.5	0.05	0.5

during systole than does normal muscle. In cases where some parts of the ventricles suffer more than other parts, the evidence of disease or fatigue in many cases is therefore revealed by abnormalities of the T-wave, the wave which, as we have said, marks the beginning of and final disappearance of the negative electrical state of the active heart muscle.

Results

In all cases we obtained electrocardiograms from the three leads. In our first series of experiments electrocardiograms were taken from three dogs whose blood did not contain the larval worms, and from three others which were infested.

Measurements of these electrocardiograms are given in table I. There were no significant differences, in rate, in width of the QRS group of deflections, in the direction or amplitude of the T wave, or in the character of the arrhythmia resulting from the influence of respiration upon heart-rate. This latter influence is generally marked in dogs. In man it is present, though to a smaller degree, in most children and in some adults. It was only in the amplitude of the R wave that any contrast was found, but the difference, as shown in table I, is probably of no significance.

Table II—*Electrocardiograms before and after exercise*

	Exercise	Lead	Heart Rate	P-R Interval (Seconds)	Amplitude of R Wave (mm.)	Duration of QRS (Sec.)	Amplitude of T Wave (mm.)
Dog 1 (Uninfested)	Before	I	104	0.14	3.0	0.045	0.3
		II	104	0.14	7.0	0.045	1.6
		III	104	0.14	4.0	0.045	1.3
	After	I	126	0.13	3.5	0.04	0.3
		II	126	0.13	6.0	0.04	1.0
		III	126	0.13	2.5	0.04	0.7
Dog 2 (Infested)	Before	I	87	0.10	9.5	0.04	1.0
		II	87	0.10	16.5	0.04	2.0
		III	87	0.10	6.5	0.04	1.0
	After	I	150	0.08	8.5	0.05	1.0*
		II	150	0.08	10.5	0.05	0.0
		III	150	0.08	2.0	0.05	1.0
Dog 3 (Infested)	Before	I	93	0.10	7.0	0.05	1.0
		II	93	0.10	11.5	0.05	2.0
		III	93	0.10	5.0	0.05	1.0
	After	I	140	0.10	5.5	0.05	1.0
		II	140	0.10	10.5	0.05	2.0
		III	140	0.10	6.0	0.05	1.0

*Inverted.

In the next series of experiments one non-infested and two infested dogs were exercised. The exercise consisted of running on a treadmill at a moderate pace for ten minutes.

Electrocardiograms were taken both before and immediately after exercise. The results are given in table II. Before exercise, the electrocardiograms were normal in all cases. After exercise, they were still all within normal limits for the dog, but striking changes had occurred in the case of one of the infested dogs. The QRS interval, which normally remains unchanged or is shortened by exercise, is here slightly longer after exercise, increasing from 0.04 to 0.05 sec. Another difference, not seen in the other exercised dogs, is the decrease in the amplitude of the R wave in all leads; in lead II the change is from 16.0 to 10.5 mm. These effects of exercise, taken together, suggest a moderate depression of intraventricular conduction.

The most significant effect, however, is upon the T wave. This wave, definitely upright in all three leads before exercise, is sharply inverted in lead I after exercise; while in lead II the T wave has practically disappeared, *i. e.*, is, in general, isoelectric.

In man exercise may modify the T wave. But we know of no reported case in which inversion was thus produced in the normal. Frequently the T becomes higher. For this reason the marked change from an upright to a strongly inverted or negative T-wave may be regarded as strongly suggestive in this dog. The character of the change produced is very similar to that which frequently occurs in man during anginal attacks, a change which is attributed to inadequate blood and oxygen supply to the cardiac muscle.

Unfortunately, when this series of experiments was carried out, only two infested dogs were available. For that reason our conclusion that the parasitic worms tend to prevent the free flow of blood through the coronaries, thus producing a relative oxygen insufficiency, must remain tentative.

It will be appreciated that such partial coronary obstruction is not the only cause of the circulatory embarrassment during exercise, as indicated by dyspnea (breathlessness) and other evidences of fatigue. In the normal animal these signs are apparent in severe exercise, and are the result of a relative oxygen insufficiency in the skeletal muscles. Even the normal circulatory and respiratory apparatus cannot supply enough oxygen to prevent fatigue of the skeletal muscles. But in the

normal animal the supply of oxygen to the heart muscle, comparatively speaking, is sufficient.

If our electrocardiogram is significant, we find, on the other hand, that in the animal infested with *Dirofilaria immitis*, the heart muscle shares in the fatigue equally with the skeletal muscle. Thus, in addition to the ordinary causes of muscular fatigue, we have the effect of fatigue of the heart. The strength of its contractions will diminish, and less blood will be pumped. Consequently the skeletal muscles will suffer still more from lack of oxygen, and the onset of general fatigue will be more rapid.

Summary

1. A very large percentage of dogs in New Orleans are infested with *Dirofilaria immitis*.

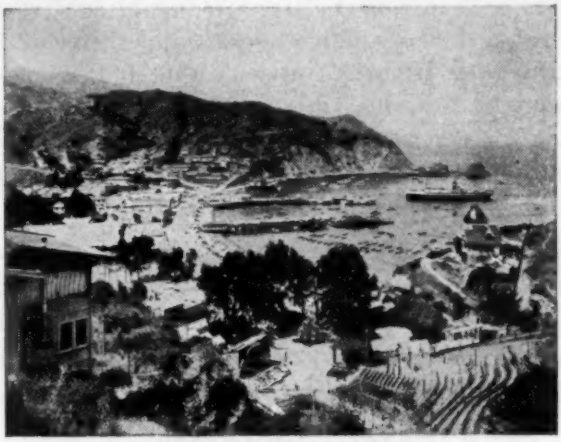
2. The adult worms are found in the heart. The blood often contains large numbers of the larvae.

3. During exercise these worms may prevent, in part, the free passage of blood through the capillaries of the body. This will have its most important results because of its influence upon the heart.

4. Electrocardiograms suggest that anemia of the cardiac muscle does, in fact, occur. This may be taken as the chief cause of fatigue often observed in infested dogs upon moderate exercise.

References

[1]Price, E. W.: Personal communication.
[2]Feil, H., and Siegel, M. L.: Amer. Jour. Med. Sci., clxxv (1928), p. 255.



Avalon Bay, Catalina Island, California

THE EFFECT OF THE BRUCELLA GROUP OF MICRO-ORGANISMS ON CHICKENS

By S. H. McNutt *and* Paul Purwin

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Zwick and Zeller[1] attempted to infect chickens with the Bang organism. They report negative results. Koegel[2] fed the organism and also injected chickens intramuscularly, intravenously, subcutaneously and intratracheally. Other than the production of agglutinins, the birds showed no evidence of infection.

Emmel and Huddleson[3,4] report finding four infected flocks. In these flocks they report decreased egg-production, a number of deaths from the infection, what they regard as a rather characteristic pathological picture, and about 20 per cent reactors. They state that "if recovery from infection takes place, it usually is very slow and often requires from four to six months for the birds to again become productive." They further report that they easily infected chickens

In the summer of 1928, it was brought to our attention that some people suspected they had contracted undulant fever from handling diseased chickens. In the only such case where it was possible to investigate the cause of death in the chickens, it was found that they were dying of a common bowel trouble and were not infected with the Brucella organism. However, to determine whether or not chickens could be infected with Brucella some experiments were inaugurated. Twenty-four White Leghorn chickens, 6 to 8 weeks old, negative to the agglutination test with Brucella antigen, were fed a suspension of mixed strains of Brucella. Strains from human, bovine, porcine and equine sources were fed, and from 22 to 90 days later the birds were killed and autopsied, and cultures and agglutination tests made. The results are shown in table I.

Chickens 1, 2 and 3 were on a deficient diet and two of them showed an agglutination titre of 1:100 as long as 75 days after feeding. The other birds were normal. There was a gradual loss of agglutinins from the 22nd to the 41st day. All autopsy findings and cultures were negative.

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TABLE I—*Showing results of feeding chicks 6 to 8 weeks old with a mixture of strains of the Brucella organism*

CHICK	AGGLUTINATION TEST		AUTOPSY FINDINGS	CULTURES
	AT (DAYS)	TITRE		
1	75	0		
	90	0	Negative	Negative
2	75	1:100		
	90	1:50	Negative	Negative
3	75	1:100		
	90	1:50	Negative	Negative
A1	22	1:50	Negative	Negative
A2	22	1:100	Negative	Negative
A3	22	1:200	Negative	Negative
A4	22	1:50	Negative	Negative
A5	22	1:50	Negative	Negative
A6	22	1:50	Negative	Negative
A7	22	1:50	Negative	Negative
A8	22	1:50	Negative	Negative
A9	22	1:50	Negative	Negative
A10	28	1:25	Negative	Negative
A11	28	1:50	Negative	Negative
A12	28	1:25	Negative	Negative
A13	28	1:50	Negative	Negative
A14	41	0	Negative	Negative
A15	41	0	Negative	Negative
A16	41	0	Negative	Negative
A17	41	1:50	Negative	Negative
A18	41	0	Negative	Negative
A19	41	0	Negative	Negative
A20	41	0	Negative	Negative
A21	41	1:50	Negative	Negative

In an attempt to determine whether or not the organism might be isolated from chickens injected with Brucella, 10 chickens 6 weeks old, negative to the agglutination test, were injected intraperitoneally with a mixture of various strains. The amount of

TABLE II—*Interval following injection when the Brucella organism could be isolated from young chickens*

CHICKEN	INJECTED	KILLED	GROSS LESIONS	CULTURE RESULTS	AGGLUTINATION TITRE
B1		10–15–28	Present	Positive—Peritoneum	1:200
B2		10–16–28	None	Positive—Peritoneum	1:100
B3		10–17–28	Present	Negative	1:50
B4		10–18–28	Present	Positive—Peritoneum	1:800
B5	10–13–28	10–19–28	Present	Negative	1:400
B6		10–20–28	None	Positive	1:100
B7		10–25–28	None	Negative	1:1600
B8		10–25–28	None	Negative	1:1600
B9		11–23–28	None	Negative	1:400
B10		11–23–28	None	Negative	1:400

culture injected was one-tenth of an agar slant. They suffered no ill effects. The results are shown in table II.

The organism was isolated up to and including the seventh day after injection but not thereafter. The injection produced a slight peritonitis, with a small quantity of slightly turbid, serous fluid and occasionally a small amount of gelatinous exudate. There were no gross changes in the parenchyma of any of the internal organs. The reaction to the injection was not specific.

In an attempt to determine how long after injection the organism could be isolated from chickens, 50 hens were inoculated by various methods. In this experiment, strains from different sources were used, also mixtures of strains. Agglutination tests were made from each chicken and the birds were killed over a period of from twelve days to five months. Only four of these chickens yielded the organism in cultures following autopsy. Table III shows the result of findings on these birds from which the organism was isolated.

TABLE III—*Maximum length of time after injection that Brucella was recovered from mature chickens*

NUMBER	INJECTED	KILLED	GROSS LESIONS	ORGANISM ISOLATED FROM
4009	8-30-28	9-12-28	Present	Peritoneal exudate
2391		9-21-28	Present	Spleen*
4047		9-12-28	Present	Peritoneal cavity
4001		9-21-28	Present	Liver†

*Hen 2391 was the only bird out of the fifty injected that showed marked evidence of infection, and that only in the spleen.
†Was injected into the liver.

In only one bird (2391) were there lesions which were the result of multiplication of the organism and invasion of the tissues. In this bird the lesions were confined to the spleen, which was moderately enlarged and somewhat light in color. The follicles were greatly enlarged, light colored and prominent. Other than this the spleen appeared normal. The organism was isolated in goodly numbers from any part of the organ. Except for this bird, autopsy findings and cultures did not show any invasion of the tissues and seemingly no bacterial multiplication. The injected organism was found at the point of injection with slight inflammation surrounding the region. Chicken 4001 from the liver of which the organism was isolated had been injected in that organ and the organism was isolated from that point only. Most of the birds in this series were killed after several months

had elapsed, which may account for negative bacterial findings in many. Cultures were made from the blood, spleen, liver, kidneys, ova, oviduct and any cysts or abnormal processes found on autopsy. Agglutination tests were run from many of these birds. A number of typical agglutination reactions are shown in table IV.

TABLE IV—*Typical agglutination tests of artificially infected chickens**

HEN	INJECTED 6-14-29	TITRES					KILLED	LESIONS	CULTURES
		6-26 -29	7-9 -29	7-30 -29	9-16 -29	11-3 -29			
308	Mixed strains	1:200	1:400	1:200			8-9-29	Negative	Negative
312	Mixed strains		1:400	1:400	1:50				
335	Mixed strains		1:400	1:400	1:400	1:400	11-3-29	Negative	Negative
2224	Mixed strains	1:200	1:400	1:400	1:400	1:400	11-3-29	Negative	Negative
460	Human	1:400	1:400	1:400	1:100	1:50	11-3-29	Negative	Negative
431	Bovine	1:400	1:400	1:400	1:100	0	11-3-29	Negative	Negative
450	Porcine	0	0	0	0		11-1-29	Negative	Negative
3305	Porcine	1:400	1:400	1:400	1:400	1:200			
329	Mixed		1:400	1:400	1:400	1:400	11-3-29	Negative	Negative

*No tests run with dilution higher than 1:400.

These tests were not run in dilutions higher than 1-400. Many of the birds continued to show agglutination in the highest dilution throughout the time they were kept. A few showed no agglutination and the others either lost or began to lose the agglutinins in their blood. An agglutination in a dilution as high as 1:400 would seem to indicate that there may have been some localization at some point in the body. However, a careful bacteriological examination failed to reveal the focus of infection after 21 days. One of the porcine strains had little ability to produce agglutinins when injected into chickens. Otherwise there was no appreciable difference in the various strains from the different sources.

An attempt was made also to determine whether or not chickens were infected on the farms throughout this part of the country. In doing this the agglutination test was used as an indication of present or past infection. A part, 1651 of the blood samples for this work, came from a produce house. Of these, 790 were males, mostly cockerels, and the remainder (861) were females, mostly hens. Only four of these chickens showed an agglutination titre of 1:400 and one showed an agglutination in a dilution of 1:1600. These birds came from about 35 to 40 flocks. In addition to the above, twenty-seven individual flocks were examined. In these

flocks were 5350 birds, of which 90 (1.5 per cent) show complete agglutination. Flock 8 was on a farm where there was no known Bang disease, although no tests of cattle or hogs had been conducted. Flock 10 was kept on a farm with other live stock, all of which gave negative tests for Bang disease. Flock 14 had had no association with other farm animals. (See table V.)

TABLE V—*Agglutination titre of blood samples of chickens from farm flocks*

Flock	Chickens Tested	Negative	Agglutination Dilution					Per Cent Reacting
			25	50	100	200	400	
5	140	140						0.0
6	180	169	5	6				6.1
7	90	90						0.0
8*	229	202	19	6	1		1	11.7
9	220	218	1				1	1.0
10*	26	26						0.0
11*	87	87						0.0
12	276	271	1	3	1			1.8
13	309	307	1	1				0.6
14*	399	398		1				0.2
15	196	191	3	2				2.6
16	340	339		1				0.3
17	158	156	2					1.2
18	200	198	1	1				1.0
19	150	148			2			1.3
20	150	150						0.0
21	120	120						0.0
22	150	144	2	1	3			4.0
23	150	147	2	1				2.0
24	200	200						0.0
25	250	244	1	2	2	1		2.4
26	170	164	3	3				3.5
27	288	285	1	2				1.0
28	310	304	4	1	1			1.9
29	197	197						0.0
30	100	100						0.0
31	265	265						0.0
27	5350	5260	46	31	10	1	2	1.7

*Bang disease in other live stock not present or not known to be present.

DISCUSSION

Attempts were made to infect 103 chickens artificially with different strains of the Brucella organism. Feeding or injecting the organism did not produce any apparent symptoms, either immediately following exposure or for a period of five months thereafter. When the organism was fed to normal chickens, agglutinins were produced which disappeared in many of the birds in less than 41 days. The organism was not recovered from chickens fed the organism. When suspensions of the organism were injected subcutaneously, intravenously or intraperitoneally,

agglutinins appeared in the blood within a very few days, but lesions were confined to the point of injection, except in one bird. Such lesions as were present showed no distinguishing characteristics. In other words such lesions might be produced by injection with organisms non-pathogenic for chickens. Following injection there was no evidence of multiplication of the organism except in the one bird mentioned above, where the organism was plentiful in the spleen. The longest time following injection when the organism was recovered from injected birds was 22 days. Twenty individual flocks have been examined and a very small percentage of birds reacting to the agglutination test in titres higher than 1:25 has been found. Reacting birds showed no symptoms of disease. There was no apparent sickness in any of these flocks.

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Tick Eradication Obstructors Sentenced

For conspiring and interfering violently with employes of the U. S. Bureau of Animal Industry engaged in tick eradication, Mann Carter and his son, Will Carter, of Echols County, Georgia, must serve seven years in jail and pay fines in accordance with the sentence imposed more than a year ago by the United States Court of the Southern District of Georgia. The United States Supreme Court, to which the case had been appealed, has refused writs of certiorari. This puts an end to the last of the several widely known Echols County dipping cases.

Mann Carter was sentenced to seven years imprisonment and was fined $11,000. His son, Will Carter, was sentenced to seven years imprisonment and was fined $1,000. These cases grew out of local opposition to the work of eradicating cattle ticks in Echols County, Georgia, which resulted in the destruction of dipping-vats, in the burning of spraying-pens, and in interference with Bureau employes. These culminated February, 1923, in the killing of one Bureau agent. Another was wounded seriously.

Notwithstanding the organized opposition to the dipping of cattle, tick eradication was completed in Echols and surrounding counties several years ago and, as a result, general satisfaction has prevailed among cattle-owners and others, the Department of Agriculture reports.

HYPERNEPHROMAS IN THE COMMON FOWL

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Hypernephromas have been recognized occasionally in some of the lower mammals, but the occurrence of a malignant neoplasm which was considered to have originated from the adrenal epithelium of the common fowl has not been reported upon, in so far as we are able to determine. The paucity of the literature upon this subject has prompted us to present the results of our study of six cases, encountered during the routine autopsies of 5500 mature birds, which we feel justified in classifying as hypernephromas.

HISTORY

Case T60 was an emaciated Barred Rock hen, two or three years of age. A pedunculated tumor, measuring 8 x 10 cm., was found in the abdominal cavity. No metastatic tumors were present. Case T187 was a Rhode Island Red hen about one year of age. The autospy findings were similar to those of the preceding case. Case T83 was a White Leghorn hen, of unknown age. Upon opening the abdominal cavity, the mesentery and visceral peritoneum were found to be covered with an undetermined number of tumors. A pedunculated tumor was suspended from the region of the ovary and adrenal gland. No other organs were involved. The lesions in this case were practically identical with those of the three following cases:

Cases T110 and T247 were Barred Rock hens, eighteen months and three years of age, respectively. Case T315 was a White Leghorn hen, at least two years of age.

SYMPTOMS

Emaciation and a pendulous abdomen resulting from the accumulation of ascitic fluid were observed in five cases. Such symptoms are frequently observed in other diseases and therefore are not diagnostic, but should suggest the possibility of a malignant neoplasm. Other symptoms of diagnostic importance were not observed.

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Morbid Anatomy

In four cases the primary tumor consisted of more than one lobe; shallow clefts gave the other two cases a decided roughened appearance. Pedunculated cysts, resembling undeveloped graafian follicles, were found occasionally, attached to the surface of the neoplasms. The predominant color was a dull gray, but areas having a light shade of yellow were found frequently. A single peduncle attached the primary growth to the spinal column in the region of the ovary and adrenal gland. Upon incision, a texture similar to that of a hard fibroma was observed. The cut surface exhibited a well-defined capsule, from which the supporting tissue was derived. Macroscopic evidence of necrosis was seldom present.

Fig. 1. An extensive involvement of the mesentery and visceral peritoneum; also a mingling of tumors and graafian follicles.

In two cases the absence of metastases was the one material deviation from a fairly constant, gross appearance. The metastases were limited to the mesentery and visceral peritoneum. There was a moderate invasion of the parenchymatous organs beneath their serous coats, but no evidence of metastases in the deeper portions. An undetermined number of neoplasms, ranging from a few millimeters to two or three centimeters in diameter, gave the serous surfaces a roughened appearance somewhat similar to that of pearl disease. Upon incision the metas-

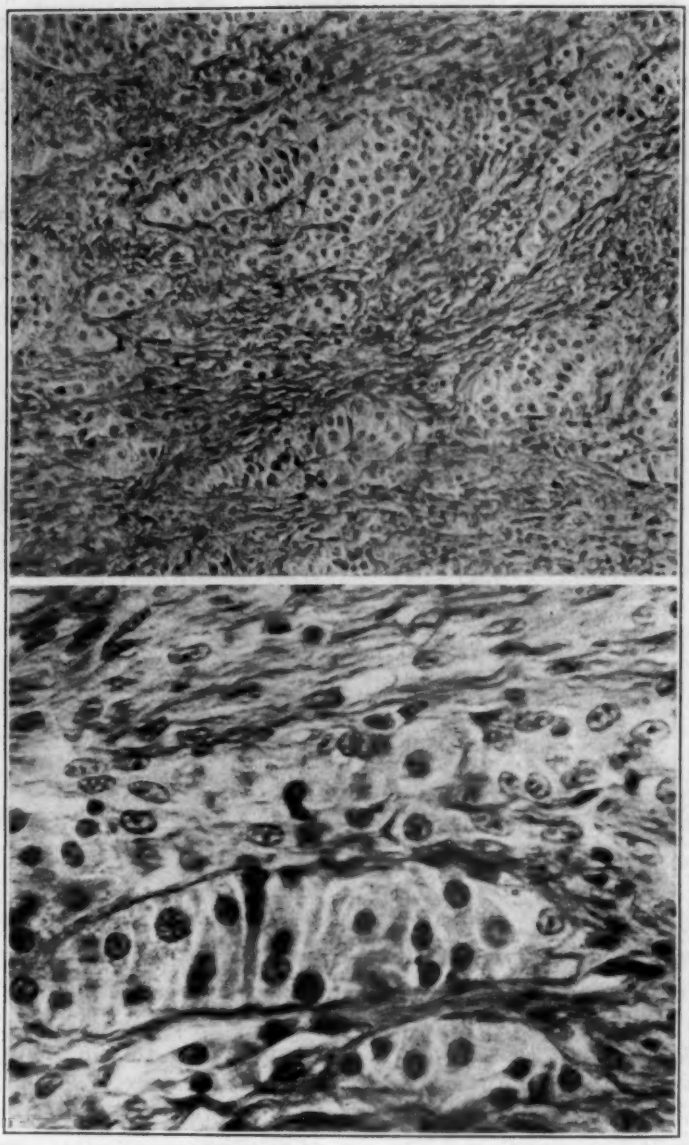

FIG. 2. (Above) Epithelial elements supported by an abundant stroma. Some of the epithelium exhibits a triangular outline.

FIG. 3. (Below) A higher magnification of fig. 2.

tases exhibited the same firm texture as was noted in the primary tumors.

Histopathology

The scirrhous and medullary appearance, observed in all cases, was one of the characteristic features. The supporting connective tissue was more abundant than is generally observed in the ordinary run of carcinomas. The appearance of the stroma was not uniform; in some cases there was an abundance of collagen and a relatively small number of nuclei; in other areas, the opposite condition prevailed. The general picture was that of mature connective tissue with no evidence that the stroma was possessed of invasive properties.

The medullary effect was the result of an acinous arrangement of the epithelium. The cells filling the acini exhibited considerable variety in both morphology and staining reactions. The type of cell most commonly observed was one with a nucleus similar to that of a large lymphocyte and a cytoplasm which had a tendency to take a faint basic stain. A reticular effect was produced by the intimate association of the cytoplasmic processes of one cell with those of adjacent cells; the cell boundaries were consequently indistinct. Necrosis of all but the germinal layer of cells gave many of the acini an adenomatous appearance.

A second type of cell was polyhedral to round in shape and the cell boundaries were quite distinct. A round, vesicular nucleus, somewhat larger than that of the preceding type, occupied but a small part of the cellular space. The cytoplasm took a faint eosin stain and exhibited a "foam-like" structure due to the presence of numerous vacuoles. It was not uncommon to find this and the succeeding type of cell resting upon a well-developed basement membrane.

A large pyramidal cell, with its base at the periphery and its apex extending to, and beyond, the center of the acinus, was particularly abundant in the two cases in which metastasis had not occurred. Observed from but a single plane, the triangular appearance and the size of this cell were its outstanding features. The cytoplasm was finely granular and took a faint eosin stain. A large vesicular nucleus was generally located in about the center of the cell.

The scirrhous aspect consisted of single and double rows of epithelial cells, separated by a liberal amount of connective tissue. The double rows of cells had the appearance of longi-

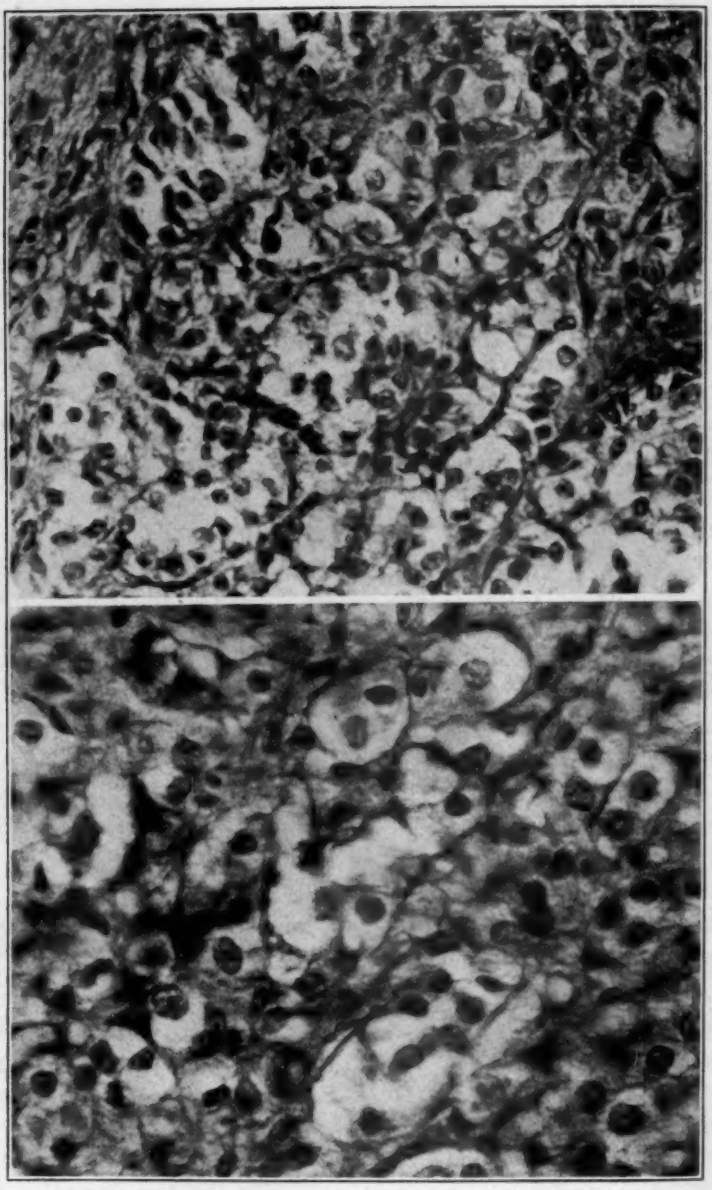

FIG. 4. (Above) Epithelium showing a high lipoid content.
FIG. 5. (Below) A field adjacent to that of fig. 4.

tudinal sections of tubules. However, a study of serial sections showed that there was no tubular formation, but that two sheets of epithelial cells had developed in apposition to one another. The epithelium in the scirrhous portions was somewhat embryonic in type, in that the nuclei were about the size of small lymphocytes and stained rather intensely. The cytoplasm, when discernible at all, took a faint eosin stain. As a whole the epithelium did not present the picture usually associated with rapid growth. The nuclei were somewhat hyperchromatic but mitotic figures

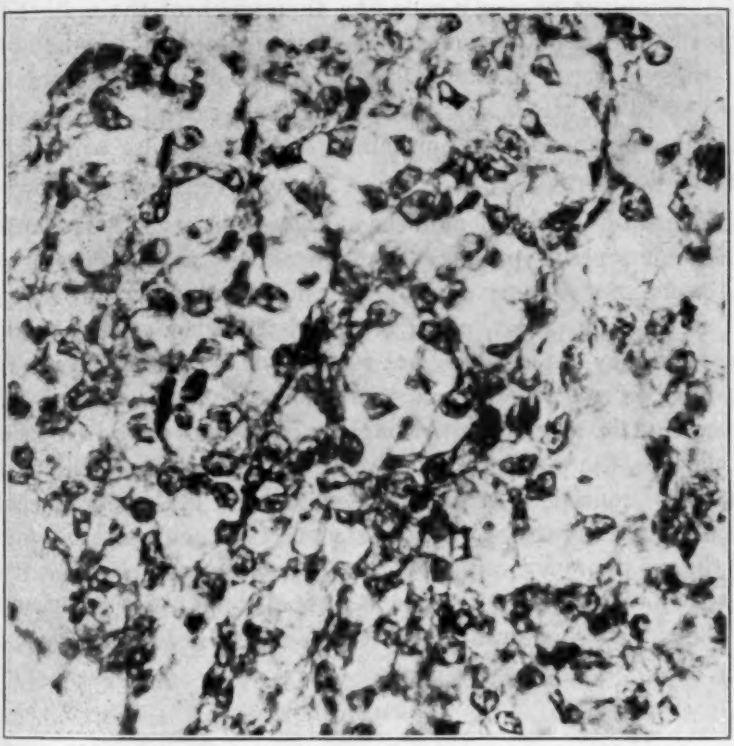

FIG. 6. Epithelium showing an elaborate interwoven network of cytoplasmic processes.

were scarce, and extensive necrosis was seldom observed. The metastases, although infiltrative in nature, did not exhibit a particularly aggressive aspect.

DISCUSSION

The six cases herein described bear considerable resemblance to the carcinomas described by Ehrenreich and Michaelis,[1] Ehrenreich,[2] Wernicke,[3] Martius,[4] Pentimalli,[5] and Joest and

Ernesti.[6] These investigators consider the ovary to be the seat of primary development. The scirrhous and medullary aspect was evidently a conspicuous part of the histopathology in every case. In addition to this common feature, Martius observed the presence of lipoid-containing cells and in the cases reported by Wernicke, and Ehrenreich and Michaelis, the metastases were confined to the visceral peritoneum.

Evidence supporting the theory that the cases herein reported represent aberrant adrenal tissue was observed in the "foam-like" structure of many cells and that much of the epithelium was resting upon a prominent basement membrane. In addition to these general characteristics of hypernephromas, the large pyramidal cell which was observed in these cases bears considerable resemblance to the epithelium of the fascicular zone of the avian adrenal.

A constant involvement of the ovary was observed, but whether this represents a primary development in this organ, or an extension of a primary development in the adrenal, or from some adjacent adrenal rest, could not be determined. Adrenal rests in the kidney are certainly not responsible, as this organ showed no involvement other than a pressure atrophy occasioned by the growth of the neoplasm. Although we have never observed such structures, the possibility of adrenal rests occurring in the ovary should be conceded. A primary development in this organ would require such an explanation, since types of epithelium encountered in these tumors are foreign to the normal ovary. It is possible for the disease to originate in the adrenal gland. The destruction of the gland, which was constantly observed, favors this hypothesis.

SUMMARY

Six spontaneous tumors of the common fowl are described. The epithelium in these cases was found to resemble that of the adrenal gland. The point of origin could not be definitely determined.

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RECENT ADVANCES IN THE PHYSIOLOGY OF DIGESTION

I. Introduction; The Mouth

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The purpose of this series of papers is to present a summary and bibliography of some recent and relatively recent work on the physiology of digestion, with special reference to domestic animals. The material is drawn from many sources, and much of it, though marking new departures in our knowledge, has not gained entrance into the current literature commonly read by veterinary practitioners, and teachers and research workers in lines other than physiology. It is hoped that the bibliography particularly will prove useful to workers in the field of animal physiology.

EATING IN CATTLE

Time spent in eating: Dairy cattle kept under modern barn conditions spend a remarkably uniform time eating during each 24 hours, the average being approximately 3 hours. No correlation appears to exist between the time spent in eating and the amount of milk-production; non-lactating cows might spend as much time eating as heavy-producing animals.[1]

Rate of eating and bolus formation: It has been found that a cow will eat 5 pounds of whole corn in 18 minutes, with formation of 25 boluses; 5 pounds of ground feed in 14 minutes, with the formation of 45 boluses; 5 pounds of whole oats in 10 minutes, with the formation of 23 boluses.[2]

Number of jaw movements: In Herbivora the number of jaw movements is large. Dairy cattle kept under modern barn conditions make approximately 94 jaw movements per minute when eating grain and silage and 78 per minute when eating hay. When the time spent in eating silage and grain, and hay, is considered, it may be calculated that the total daily number of jaw movements is approximately as follows:

Eating grain and silage	4,700
Eating hay	10,530

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Add to these 26,400 jaw movements of rumination and we have the astounding total of approximately 41,630 jaw movements in 24 hours.[1]

Degree of mastication: In ruminants the mastication of eating is imperfectly performed. The object seems to be to get the food into condition for swallowing with a minimum outlay of energy. The remastication is thorough. In cattle, Schalk and Amadon[2] found that whole oats enter the stomach practically unbroken and that whole corn is crushed to the extent of only about 50 per cent. Corn on the cob is masticated to a greater extent than whole corn.

Saliva

Secretion of saliva: In man and the dog, salivary secretion may be called forth even before food enters the mouth. The sight and odor and even the thoughts of savory food may, as everyone knows, cause secretion of saliva. Such a reflex flow has been designated a psychic secretion. In Herbivora psychic secretion appears to be slight or absent. Thus, in the horse, Seymour[3] reports it as being slight, while Scheunert and Trautmann[4] found it to be absent, and in the sheep the latter observers[5] noted only a slight psychic secretion. Since the dog develops this conditioned reflex and herbivores apparently do not, the field should be one of interest to the comparative psychologist.

In the horse, chemical stimulation is said to play but little part in parotid secretion, the stimuli being mainly mechanical.[4] This is distinctly different from the condition in man.

It has long been known that the secretion of parotid saliva is continuous in the ox. This has lately been shown to be true for the sheep[5] and is probably true of ruminants generally. The mandibular gland of these animals does not secrete between meals nor during rumination.

Reaction of saliva: Tne saliva of man is now known to be generally slightly acid in reaction, Starr[6] reporting an average of pH 6.6. This view is contrary to popular conception and to earlier views that the reaction is alkaline. Recent work on the saliva of domestic animals shows that all species studied secrete a slightly alkaline saliva except the ox and sheep, which produce a distinctly alkaline secretion. It is probable that the relatively high alkalinity of ruminant saliva is related to the control of the acidity of fermentation in the rumen.

Schwarz and Hermann[7] obtained mean pH values for saliva as follows:

Horse and dog	7.56
Pig	7.32
Ox	8.1

Schwarte,[8] using a colorimetric method, obtained the following results:

Horse	7.42
Ox	8.23
Pig	7.37
Dog and cat	7.5

Scheunert and Trautmann[5] found the parotid saliva of the sheep to possess a high alkalinity.

Action of saliva: It is common knowledge that the saliva of man contains an amylolytic enzyme, known as ptyalin or salivary amylase, capable of converting starch into maltose. The question of the existence of a similar enzyme in the saliva of domestic animals is an important one and one about which there has existed much difference of opinion and a good deal of loose thinking. A study of recent literature seems to justify the statement that among domestic animals the pig stands apart in possessing a saliva containing a sufficient amount of amylase to be of significance in digestion. Even in this animal the amylolytic power of saliva is many times weaker than in man. Some might classify the dog with the pig in this regard, although the balance of evidence does not warrant such a classification. A summary of the literature follows:

Horse: Mixed saliva contains no amylase.[8,9,10] Parotid saliva contains no amylase.[4] The salivary glands produce insignificant amounts of amylase.[3,11,12] The conclusions of Palmer and co-workers[13] that the salivary glands of the horse produce an inactive ptyalin, which is activated by orokinase formed by the buccal and possibly the lingual glands, could not be confirmed by Hayden[11] nor by Finkelstein.[12]

Ox: The saliva contains no amylase.[8,10] It contains an insignificant amount of amylase.[12,14]

Sheep: The saliva contains no amylase.[5,15]

Goat: The saliva contains no amylase.[9,15]

Pig: The saliva contains amylase, but its action is 114 times weaker than that of human saliva.[10] The saliva contains amylase,[8] the intensity of whose action was not determined.

Dog: The saliva contains a small amount of amylase of blood origin.[16,17] The saliva contains no amylase.[10] "Polyamylase"

is occasionally present in small amounts.[18] Submaxillary saliva possesses amylolytic power.[19]

Cat: The saliva contains a small amount of amylase of blood origin.[16] It contains no amylase.[15]

Fox: Parotid saliva contains a small amount of amylase of blood origin.[9]

Rabbit: The saliva has a weak amylolytic action, but the possibility of the enzyme being of food origin was not excluded.[15]

Guinea pig: The saliva undoubtedly contains amylase.[15]

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Indiana Restricts Lay Vaccination

The State Live Stock Sanitary Board of Indiana has promulgated an order, effective August 1, which requires all persons to secure a permit from the Board to use veterinary biological products. The rule makes illegal the sale or purchase of vaccines, or the use of such products, without a permit from the Board. The rule does not apply to farmers who may desire to vaccinate their own animals. Permits issued to farmers or veterinarians will be revoked for the careless or unscrupulous use of dangerous immunizing agents, the use of which is restricted by the order, according to Dr. F. H. Brown, secretary of the Board.

A METHOD FOR DETERMINING THE AGGLUTINATING POWER OF BEAN EXTRACT FOR RED BLOOD CELLS OF SWINE

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Dorset and Henley[1] described a method of using a saline extract of the navy bean (*Phaseolus vulgaris*) in the separation of red blood cells from serum. The same authors[2] presented a detailed method for the preparation of the extract and for its use in the manufacture of clear anti-hog cholera serum. This product, together with a saturated solution of sodium chlorid, is generally used in the preparation of clear anti-hog cholera serum.

Although the technic for the preparation of this product has been standardized, the agglutinating power of the bean extract obtained often varies considerably with different lots. It is reasonable to assume that the agglutinating principle found in navy beans is not present in constant amounts under all conditions. The age of the beans, the constituents of the soil, and the climatic conditions may be factors in causing such variation.

It seemed advisable to endeavor to determine a method for titrating the agglutinin content of the bean extract to be used in the preparation of clear serum. With this information at hand, steps could then be taken to prepare extracts of uniform agglutinating power, thus insuring more constant results in the separation of serum from the red blood cells.

EXPERIMENTAL

Attempts were made to develop a test in which various dilutions of blood were mixed with diluted and undiluted bean extract in test-tubes. These tests were not successful. The agglutination was not complete and the degree of settling varied according to the dilution and the age of the samples. In every case it was necessary to use very low dilutions of bean extract to produce agglutination.

More satisfactory results were obtained by the use of a macroscopic slide method of agglutination which was developed in this work. The technic was a modification of the general methods of Neisser,[3] Bass and Watson,[4] Garrow,[5] and Wright.[6] This

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method was later adapted to the agglutination of *Brucella abortus* by Huddleson and Carlson.[7]

Equipment

The equipment necessary for the test consisted of the following items:

1. A supply of test-tubes, approximately 5 x 7/8.
2. 10-cc pipettes.
3. 1-cc pipettes of uniform caliber.
4. Block or rack for holding test-tubes
5. Glass plate 18″ x 10″ ruled in squares 1½″ in diameter.
6. Light to illuminate the glass plate.

A temporary plate was prepared from window glass and the ruling was accomplished by aid of a wax pencil. Later, a permanent plate was prepared using plate glass. This was etched with a glass cutter or aqua regia. A small light bulb on a cord or a microscope lamp served to illuminate the plate.

Reagents

1. The bean extract was diluted in physiological salt solution in series from 1:100 to 1:3000 or higher if desired.

2. The antigen consisted of pooled samples of defibrinated blood from three or more hogs. Final bleedings were used when possible.

The Test

1. Two drops of physiological salt solution were transferred to one square of the glass plate with a 1-cc pipette. This preparation served as a control.

2. Two drops of the highest dilution of bean extract were then placed in a square upon the glass plate, using the same pipette. The entire series of dilutions were then transferred to the plate in the same manner, finishing with the least dilute sample.

3. One drop of the pooled sample of blood was added to each of the dilutions of bean extract and the saline control on the plate.

4. The tests were then mixed with a tooth-pick or wooden applicator, beginning with the control and proceeding from the highest dilution of bean extract to the lower dilutions. The plate was then tilted carefully to facilitate thorough mixing.

5. The plate was supported in such a manner that a light could be passed beneath to facilitate the reading of the test. After 8 to 10 minutes, the test was examined by passing a mic-

roscope lamp, or small light-bulb, beneath each dilution and observing the reaction macroscopically. If the plate was used over an inclosed box containing electric light bulbs, the test was read after 5 to 8 minutes. The reading was facilitated by gently tilting the plate to create a slow movement of the clumps of cells.

The Reaction

The agglutination occurred within 5 to 10 minutes after the test was made. The rapidity depended upon the concentration of agglutinins in each dilution. When the test was allowed to stand longer than 12 to 15 minutes, the mixture began to dry at the edges and the appearance of the preparation was modified and distorted.

Because of the addition of one drop of blood to two drops of diluted bean extract upon the plate, the dilution of the latter was increased 50 per cent; that is, the 1:100 dilution in the tube became 1:150 on the plate.

Positive reactions consisted of definite clumping of the red cells with intermediate clear areas between the clumps. The intensity of the reaction was evidenced by the difference in the size of the cell clumps. These varied from large masses in the lower dilutions of extract to very fine evenly distributed clumps in dilutions which approached the titre limit.

Considerable care was necessary in the selection of the blood samples used in the test. Some samples were found which agglutinated spontaneously, while others failed to distribute evenly in the saline controls. These samples were discarded and new blood samples were selected. The suitability of the blood used as antigen was readily determined by close observation of the saline control sample.

With the aid of this test, it has been possible to produce bean extract of uniform agglutinating properties. The standardization of the bean extract by this method insures against the use of inferior extracts, with the resulting loss in yield of clear serum.

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All dogs in Covington, Kentucky, must be vaccinated against rabies, according to an ordinance passed July 3.

AN OUTBREAK OF COCCIDIOSIS IN LAMBS

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While it is evident that coccisiosis is occurring in lambs with increasing frequency in the United States, not many articles dealing with the disease are appearing in the literature. It seems to have been first described by Curtice,[1] in 1892, and next by Martin,[2] in 1923. The present authors wrote a description of the disease in 1925,[3] and it was observed in sucklings by Jungherr and Welch,[4] in 1927. The purpose of this article is merely to outline a series of outbreaks occurring in feeder lambs, during the fall of 1929, that, in point of numbers affected and mortality experienced, have exceeded anything previously seen by us.

Table I—*Coccidial dysentery, 1929*

Lot	Origin	Arrived	First Sick	Lambs	Sick		Dead	
					No.	%	No.	%
1	Winnemucca, Nev.	10-8	10-18	1290	200	16	72	5.6
2	Douglas, Wyo.	10-11	10-27	1557	400	26	75	4.8
3	Glenrock, Wyo.	10-20	10-25	600	136	23	47	7.8
4	Glenrock, Wyo.	10-20	10-29	1200	47	4	8	0.66
5	Glenrock, Wyo.	10-20	11-2	900	400	44	42	4.7
6	Rosebud, Mont.	10-21	11-3	900	300	33	52	5.8
7	Grant, N. M.	11-12	12-1	4300	1250	28	77	1.8
8	Grant, N. M.	11-12	12-1	1700	200	12	13	0.75
9	Sandia, N. M.	11-12	11-20	1000	300	30	15	1.5
			Totals	13,447	3233	24	401	3.0

Table I will give most of the pertinent facts relating to the shipments. It will be seen that the lambs originated in four states: Nevada, Wyoming, Montana and New Mexico. All were seen in the vicinity of Fort Collins, Colorado, except lot 1, which occurred near Greeley. Lot 1 occurred in the practice of

Dr. E. E. Tobin, of Greeley; lots 2 and 4 in the practice of Dr. R. N. McCarroll, Fort Collins, and the rest of them were treated by Dr. James Farquharson, of our faculty. Our thanks are due to these men for much of the data presented.

Cause

Feces from several lambs in each flock showed large numbers of coccidia (*Eimeria faurei*) when the material was merely placed on a slide and examined under the low power of the microscope. No concentration was necessary. Negative cultures from spleen and heart-blood from all of the outbreaks eliminated paratyphoid dysentery.

Fig. 1. Lamb affected with coccidiosis.

As in every case the disease was precipitated soon after shipping, it was only natural to look for some predisposing cause. This effort, however, met with disappointment. Lots 3, 4 and 5 were shipped from the same point on the same train, and arrived at the same time. Practically the same may be said of lots 7, 8 and 9. In no case did the lambs remain on the train longer than 30 hours without feeding, nor were they exposed to bad weather in transit. To make the case still more baffling, other lots of lambs were shipped at the same time, handled in the same way, and arrived on the same day without developing any symptoms whatever. To cite a specific instance, lot 9 (table I) deals with

only one-half of an original flock of 2000 that were shipped from Sandia, New Mexico, to Fort Collins, Colorado, being divided after arrival and going to feeding pens of two brothers-in-law. One lot developed the disease while the other did not.

There was nothing common to all of the lots except the fact they had been shipped recently. About half of them came in from the north and the rest came from the south. They were not fed in the same yards nor shipped on the same railroads. They are grouped together merely because they developed the disease about the same time.

Incubation Period

Assuming that the exposure took place in transit, then the longest incubation period was approximately three weeks (lots 7 and 8), while the shortest was about six days (lot 3).

Symptoms

Profuse diarrhea was the most constant and most prominent symptom. Frequently the fecal discharge was tinged with blood. Tenesmus was common. In the more severe cases blood-tinged fluid dripped almost constantly from the anus. The tail and hind legs became matted with thin feces. The lambs became very weak and lost weight rapidly. Temperatures were frequently elevated, some running as high as 106° F. Before death the temperature usually became subnormal. With increasing weakness the lambs refused food, got down, were unable to rise, and died in large numbers during the first few days of the outbreak.

Approximately twenty-five per cent showed definite symptoms which were so severe as to cause great anxiety on the part of the owner. Considering the morbidity rate, the mortality (3 per cent) was surprisingly low. It seemed to both the owners and the practitioners in charge that the death-rate must run very high. In most cases the animals died in the first few days of the outbreak, or they recovered.

Lesions

The lesions were chiefly confined to the large intestines and occurred most constantly in the cecum, although in several instances they extended into the ileum and occasionally to the duodenum. The most characteristic appearance was in the cecum where the wall was usually thickened, deeply reddened but streaked with gray. The intestinal content was often colored a dark red, due to admixture with blood.

Treatment

Treatment varied somewhat, according to the practitioner, but for the most part naphthalin, tannic acid, salol and bismuth were used in an oil solvent. The lambs showing symptoms were separated and treated individually. As they stopped scouring they were returned to the main flock. Dr. Farquharson used a mixture in the following proportions:

Bismuth subnitrate	3 gr.
Tannic acid	2 gr.
Mineral oil	1 ounce

He gave two ounces of this combination for the first dose and then one ounce daily until recovery was shown. The results were apparently good, although no controls were kept.

Summary

An outbreak of coccidiosis occurring in feeder lambs during November and December of 1929 is described.

Nine lots, comprising 13,447 lambs, were involved, in which the morbidity rate was 24 per cent and the mortality rate 3 per cent. The only factor common to all lots was that they had been shipped recently.

Coccidia (*Eimeria faurei*) were numerous in the feces.

A method of treatment is described that was apparently successful.

References

[1]Curtice, Cooper: Jour. Comp. Med. & Vet. Arch., xiii (1892), p. 225.
[2]Martin, H. M.: No. Amer. Vet., iv (1923), p. 142.
[3]Newsom, I. E., and Cross, Floyd: Colo. Agr. Exp. Sta. Bul. 304 (1925), p. 8.
[4]Jungherr, Erwin, and Welch, Howard: Jour. A. V. M. A., lxxii (1927), n. s. 25 (3), pp. 317-326.

CONTROLLING AN OUTBREAK OF RABIES

By C. H. Larson, *Clarksville, Arkansas*

On May 15, this community was confronted with an outbreak of rabies which threatened to assume serious proportions. Seven clinical cases were observed by the writer over a period of three days, and an unknown number of suspected cases were killed without examination.

To verify the clinical diagnosis the eighth case was submitted for a laboratory diagnosis. The writer received a wire the following day, reporting Negri bodies and a positive diagnosis of rabies. Fortunately only two humans and two cows had been exposed. The Pasteur treatment was started immediately in each case.

Control measures were instituted right away, requiring the strict isolation of owned dogs, the prophylactic vaccination by the single-injection method, and the destruction of all stray dogs, which are a real menace in any outbreak of rabies. Some opposition was apparent at first but this was quickly overruled and the writer can state now that all individuals concerned in the immediate action taken are proud to have been instrumental in stopping such a disease almost as quickly as it started.

The motive of this report is to stress again the satisfactory results that are obtainable when the city health officials and the local veterinarians cooperate, particularly in dangerous diseases that are common to both man and animal.

APOPLEXY IN A BERKSHIRE BOAR

By J. F. BULLARD, *Lafayette, Indiana*

Department of Veterinary Science
Purdue University Agricultural Experiment Station

Subject: A Berkshire boar about two years of age. This boar had always been in apparently good health until the last time he was used for breeding. During this service he fell suddenly to the ground. He arose immediately and started walking in an aimless manner in various directions in the pen, and up and down the

FIG. 1. The dark area represents the large blood clot in the right cerebral hemisphere.

fence, bracing or pushing himself against it. At other times he would lie down or stand with his head forced into a corner.

Death occurred in ten days from the time the first symptoms appeared. During this interim the boar did not eat or drink although he appeared thirsty. When water was given to him with a dose-syringe, he experienced no difficulty in swallowing it.

Autopsy: The lesions were confined to the brain. A longitudinal section of the right cerebral hemisphere, parallel to the longitudinal fissure and about one-half inch lateral to it, revealed a well organized blood clot, two centimeters long and one centimeter wide. A smaller blood clot of more recent origin was also present. These clots involved the medullary portion of the hemisphere just dorsal to the cerebral peduncle, and portions of the optic thalamus and corpus striatum.

FOREIGN BODIES IN MULES

By E. L. KITTRELL, *Augusta, Ark.*

Subject: Mule, five years old. The patient appeared to have a small rupture, but there was no sign of any injury, and the owner claimed that the mule had been that way for several weeks.

Treatment: On palpation I could feel something that felt like a splinter. With a hypodermic needle I drew off a small portion of the contents of the swelling to see what was inside. The contents proved to be pus. I then made a small incision and introduced a probe, with which I could readily feel a foreign body. I then enlarged the opening and removed a piece of wire three inches long. The patient is doing well, with a local dressing of pyoktanin blue mixture applied twice daily.

CASE 2

Subject: Another mule, this time with hoe-handle stuck in lateral and posterior to the right mammary gland to a point near the anus where the skin was pushed out.

Treatment: The mule was cast and I dissected down about four inches. I then tied a stout cord to the hoe-handle and, with the aid of a negro, I pulled out the foreign body, which measured about eighteen inches. I then established good drainage and painted the inside of the wound thoroughly with tincture of iodin. The mule was then turned out to pasture and given no further treatment, as it was too mean to be handled frequently. Ten days later the mule was back at work.

New Parasite Found

Professors Speroni, Llambias, Parodi and Nino, of Argentina, report the discovery of a new parasite, *Cryptococcus psichrophilicus*, that causes generalized blastomycosis in the human subject.

EXPERIMENTAL EPIDEMIOLOGY OF TUBERCULOSIS. The Effect of Crowding upon Tuberculosis in Guinea Pigs Acquired by Contact and Inoculation. Max B. Lurie. Jour. Exp. Med., li (1930), 5, p. 729.

If normal guinea pigs are confined with an equal number of tuberculous cage-mates, the incidence of "contact" tuberculosis is increased by crowding. This is probably due largely to an increase in the amount of tubercle bacilli available in the more crowded cages, although no constant relationship could be established between the intensity of the exposure and the incidence of tuberculosis acquired by contagion. Other factors must be determined. If guinea pigs are inoculated intraperitoneally with a given quantity of human tubercle bacilli and distributed in different degrees of crowding, the duration of survival is shortened in the more crowded animals and the incidence of chronic types of tuberculosis is greater among the less crowded animals.

EXPERIMENTAL EPIDEMIOLOGY OF TUBERCULOSIS. Air-borne Contagion of Tuberculosis in an Animal Room. Max B. Lurie. Jour. Exp. Med., li (1930), 5, p. 743.

Guinea pigs living in the same room but not in the same cage with tuberculous animals acquire tuberculosis characterized by a chronic course, a marked involvement of the lungs, often with cavity formation and a massive tuberculosis of the tracheobronchial nodes; the mesenteric and cervical nodes are slightly or not at all affected. The route of infection in these guinea pigs is almost always the respiratory tract. Of 103 guinea pigs exposed for a period of 32 months, 15 (14.5 per cent) developed tuberculosis. The shortest period of exposure leading to tuberculosis was 8 months. A large percentage of the guinea pigs weathered a continuous exposure to the tubercle bacillus for 32 months without becoming tuberculous. This may be due to an innate natural resistance against tuberculosis, or to an acquired immunity resulting from the continuous exposure to the contagion.

EXPERIMENTAL EPIDEMIOLOGY OF TUBERCULOSIS. The Route of Infection in Naturally Acquired Tuberculosis of Guinea Pigs. Max B. Lurie. Jour. Exp. Med., li (1930), 5, p. 769.

In tuberculosis of guinea pigs acquired by contact with tuberculous guinea pigs, under conditions permitting the entrance of tubercle bacilli by way of both the alimentary and the respiratory tracts, the type of lesion produced depends upon the relative intensity of exposure to infection by one or the other channel. With the gradual elimination of exposure to alimentary infection, tuberculosis is more and more completely engrafted through the respiratory route. With the gradual increase in the intensity of exposure to alimentary infection, the disease becomes more and more completely enteric in origin. Some evidence is presented that the engrafting of tuberculosis by way of the alimentary route inhibits the development of the respiratory disease.

EXPERIMENTAL EPIDEMIOLOGY OF TUBERCULOSIS. The Effect of Eliminating Exposure to Enteric Infection on the Incidence and Course of Tuberculosis Acquired by Normal Guinea Pigs Confined with Tuberculous Cage-Mates. Max B. Lurie. Jour. Exp. Med., li (1930), 5, p. 753.

If normal guinea pigs are confined with tuberculous cage-mates, in cages where food becomes contaminated with the excreta laden with tubercle bacilli of the inoculated animals, the incidence of acquired tuberculosis among them is greater than among guinea pigs similarly exposed in cages where the mode of infection is largely eliminated. The disease acquired in the first type of cage is largely of enteric origin and is chronic in type. The disease acquired in the second type of cage is of respiratory origin and has a more acute course.

CYSTOSCOPY IN MALE AND FEMALE DOGS. Vincent Vermooten. Jour. Lab. & Clin. Med., xv (1930), 7, p. 650.

The ureters of male dogs are more easily catheterized than those of females. Great care in technic must be used to prevent infecting the bladder or kidney pelves during cystoscopy, for this seems to occur far more reaily than is generally supposed and in none of the dogs that once became infected did the infection ever clear up spontaneously. Infection is most cases was due to the colon bacillus and occasionally to a staphylococcus. Large doses of morphin sulphate given subcutaneously produced a

satisfactory anesthesia. At present the author uses 2 cc of a 30 per cent solution of sodium iodid in a kidney pelvis which is assumed to be normal. In cases of hydronephrosis or hydroureter, much more solution must be used. As much as 20 cc have been used without any apparent discomfort and with no subsequent ill effects to the dog.

FERMENTATION OF MONOSACCHARIDS BY ORGANISMS OF THE ABORTUS-MELITENSIS GROUP. Marion B. Coleman, Helen H. Owen and Gladys Dacey. Jour. Lab. & Clin. Med., xv (1930), 7, p. 641.

The authors present a preliminary report of the action of 39 strains of the abortus-melitensis group (21 bovine strains, 12 human strains, 4 porcine strains, 1 caprine strain and 1 unknown strain). The medium used was a sugar-free 2 per cent beef infusion-agar base containing 3 per cent chlor-phenol-red as indicator. The pH was 6.8. Serum (10 per cent) and filtered solutions of the carbohydrates (1 per cent) were added with sterile precautions before the agar was tubed and slanted. Inoculations were made by stabbing the butt and streaking the slant. Arabinose was fermented by all strains; xylose by all except one, which was of human origin; galactose was fermented by 1 caprine strain, by all but one bovine and by all but two human strains. Dextrose was fermented weakly by 13 bovine, 5 human and 6 caprine strains. Levulose was fermented weakly by 10 bovine and 2 human strains. Rhamnose and lactose were not fermented by any of the strains tested.

BACTERIAL FLORA IN FECES OF THE NORMAL FOWL. M. W. Emmel. Jour. Inf. Dis., xlvi (1930), 4, p. 293.

Escherichia coli and *Escherichia communior* were the predominating organisms found in the feces of ten two-week-old chicks and twenty hens, both being about equal in their average occurrence and constituting an average of 60 per cent of the total organisms present. These organisms appear to be constant inhabitants of the feces of normal fowls. The bacterial flora of the two-week-old chicks did not differ materially from that of the adult birds except that there was more or less instability as far as the colon organisms were concerned in the chicks. Comparatively few other species of organisms make up the remainder of

the total flora in individual birds and the occurrence of these organisms varies with environmental conditions. Three obligate anaerobes were found in the flora of the thirty birds studied.

Microbic Dissociation in the Abortus-Melitensis Group. James G. McAlpine and Wayne N. Plastridge. Jour. Inf. Dis., xlvi (1930), 4, p. 315.

The authors describe the cultural, morphological, biochemical and serological characteristics of a mutant type occurring in the abortus-melitensis group. According to Hadley, this form should be called a dissociate. No attempt has been made to classify it as an S or R type. The results show that the mucoid forms of *Bact. abortus* and possibly *Bact. melitensis* possess a double antigen complex. On the other hand, only one complex is present in the normal type.

The Physiological Effect of Pituitary Extract on the Lactating Mammary Gland. Chas. W. Turner and I. S. Slaughter. Jour. Dairy Sci., xiii (1930), 1, p. 8.

The maximum physiological effect indicated by a discharge of residual milk was obtained by approximately 0.5 cc of pituitrin per 100 pounds live weight of the cow. A temporary inhibition of milk secretion, which varied in intensity with the amount of pituitrin injected, was indicated by the yield of milk obtained at the next regular milking. The inhibitory effect of 10 cc of pituitrin lasted approximately ten hours. The time required for the pituitrin to become effective varied with the size of the injection. The greatest yield of milk was obtained at the end of 10 minutes, when 12 cc was injected, whereas 20 minutes were required when only 6 cc was used. The data confirm the work of previous investigators in indicating that probably fat alone of the constituents of milk is influenced by this extract.

B. Paludis: A New Species of Pathogenic Anaerobic Bacterium. A. D. McEwen. Jour. Comp. Path. & Therap., xliii (1930), 1, p. 1.

From twelve cases of disease in sheep in which the muscular tissue presented lesions characteristic of those produced by the pathogenic sporulating anaerobic bacteria, a new species of pathogenic sporulating anaerobic bacillus has been isolated. This bacillus has been named *B. paludis*. In five cases *B.*

paludus was present in the infected muscular tissue in pure culture, and in all twelve cases smears from the muscle tissue showed the bacillus to be present in very large numbers. *B. paludis* is considered to have been the cause of the disease which brought about the death of the animals. *B. paludis* presents many features in common with *B. welchii*. The chief feature distinguishing between the two bacilli is the specificity of their toxins, which is discussed by the author in detail. The morphological and cultural characteristics of the bacillus, its pathogenic action and its toxin are given.

TYPES OF TUBERCLE BACILLI IN SWINE TUBERCULOSIS. R. L. Cornell and A. Stanley Griffith. Jour. Comp. Path. & Therap., xliii (1930), 1, p. 56.

Natural tuberculosis in swine may be the result of infection with bovine, avian or human bacilli. The chief cause of swine tuberculosis is the bovine tubercle bacillus. The avian tubercle bacillus is responsible for a considerable proportion of the cases in which the tuberculosis is apparently confined to the lymphatic glands of the alimentary tract. These findings corroborate those of other workers in America and on the continent of Europe, and support their recommendation that pigs and poultry should not be allowed to run together over the same ground.

STUDIES ON BOVINE MASTITIS. Diagnosis by Means of the Reaction of the Milk to Brom-cresol-purple. A. W. Stableforth. Jour. Comp. Path. & Therap., xliii (1930), 1, p. 22.

Brom-cresol-purple was used to indicate the reaction of most of the milk samples examined. In three series of 480, 1246 and 811 samples, respectively, it was shown that a single normal result or even a series of normal results is of no value in the diagnosis of mastitis, because a quarter which is constantly excreting streptococci, or which may have recently shown clinical symptoms, frequently gives a series of normal reactions. On the other hand, a single abnormal reaction or in a greater degree a series of abnormal or doubtful reactions, points to the probability of disease. Factors other than disease which may affect the results are considered. The findings of other workers relative to the question of diagnosis are analyzed.

THE SEROLOGIC DIAGNOSIS OF PULLORUM DISEASE IN DOMESTIC FOWLS. I. Variation in agglutinability of *B. pullorum* and elimination of the so-called "cloudy" reaction. E. P. Casman, George Valley and Leo F. Rettger. Jour. Immunol., xviii (1930), 5, p. 353.

Using three strains of *Bact. pullorum*, it is shown that the usual variations in the cultural conditions such as temperature, original pH of the agar medium and frequency in transferring cultures have less influence on agglutinability than the final pH of the culture antigen and the temperature at which the agglutination is conducted. Antigens adjusted to pH 6.4 and to pH 8.0 were more agglutinable than the same antigen adjusted to pH 7.0. At 37° C. the rapidity and degree of agglutination were much greater than at 16° C. Attempts to select daughter strains of different agglutinability were unsuccessful, indicating further that the strains with which these studies were conducted are remarkably constant in their agglutination property. By employing phenol in concentrations of from 0.2 to 0.3 per cent and adjusting the H-ion concentration of the antigen to pH 8.2 to 8.5, the formation of the flocculent precipitate was prevented. At this pH the bacteriostatic action of the phenol (0.2 to 0.3 per cent) is apparently complete. The suppression of the pH by sera which tend to produce "cloudy" reactions when added to the agglutination fluid is apparently reported for the first time.

THE SERIOLOGIC DIAGNOSIS OF PULLORUM DISEASE IN DOMESTIC FOWLS. II. The chemical nature and the mechanism of the "cloudy" reaction. George Valley and E. P. Casman. Jour. Immunol., xviii (1930), 5, p. 379.

The precipitate obtained in the agglutination tube consists of protein and lipoid fractions. It is suggested that under the conditions (increased H-ion and salt concentration) prevailing in the agglutination tube, a lipin-protein complex formed from substances in the serum is precipitated. Evidence is cited to show that phenol in 0.5 per cent concentration may cause precipitation of certain protein constituents of the serum. It is further indicated that, aside from metabolic changes accompanying egg-laying, such factors as muscular exercise or shock may influence the pH and the lipoid content of the serum and consequently cause "cloudy" reactions. While the predisposing causes for the "cloudy" reaction undoubtedly arise in the serum,

the phenomenon of precipitation is nevertheless profoundly influenced by the conditions prevailing in the agglutination tube.

THE CALCIFICATION OF TUBERCLES BY MEANS OF IRRADIATED ERGOSTEROL. Tom Douglas Spies. Amer. Jour. Path., vi (1930), 3, p. 337.

A marked calcification of the caseous and necrotic centers of the tubercles of the lung can be produced by the administration by repeated large doses of activated ergosterol in the last stages of acute tuberculosis in rabbits. Five rabbits which received only one dose of irradiated ergosterol did not show any calcium within the tissues. It is suggested that a high-vitamin-D diet might possibly be useful in some cases of pulmonary tuberculosis.

BACTEREMIA DUE TO SALMONELLA SUIPESTIFER. Sara E. Branham, L. J. Motyca and C. J. Devine. Jour. Amer. Med. Asso., xciv (1930), 22, p. 1758.

From the blood of a patient suffering from an acute febrile condition, a Gram-negative motile bacillus was isolated. This microörganism was identified as *Salmonella suipestifer*. Human infections with this organism, other than those presenting the clinical picture of either food poisoning or pneumonia, are rare. A complete history, clinical and autopsy records of the case are presented.

BRUCELLA ABORTUS IN CERTIFIED MILK. D. E. Hasley. Jour. Inf. Dis., xlvi (1930), 5, p. 430.

It is possible to detect *B. abortus* in market certified milk by plating methods. *B. abortus* was grown from 10 of 230 samples examined, the 10 positive samples being obtained from three of the five dairies studied. The highest number of organisms found was 8 per cubic centimeter of milk; the average for the ten positive samples was 2 per cubic centimeter.

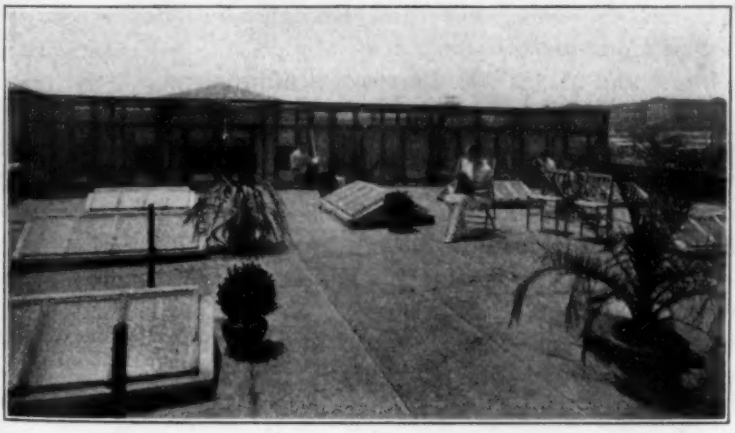
BRUCELLA ABORTUS AGGLUTININS IN PORCINE BLOOD. R. A. Boak and C. M. Carpenter. Jour. Inf. Dis., xlvi (1930), 5, p. 425.

Agglutination tests for *Br. abortus* agglutinins on 4,014 sera from porcine blood samples collected in New York State and from seven mid-western states showed 64 (1.54 per cent)) to be positive. From New York, 1054 samples showed 0.19 per

cent positive; Ohio, 174, of which 1.72 per cent were positive; Illinois, 846, of which 1.89 per cent were positive; Indiana, 1230, of which 2.27 per cent were positive; Missouri, 485, of which 1.65 per cent were positive; Minnesota, Iowa and Nebraska, 110, 45 and 70, respectively, all of which were negative. The authors point out that the 1054 samples from New York State were perhaps more accurately representative of the amount of disease in that section than are the 2960 samples representative of the conditions in the mid-western states.

TRANSMISSION OF PULLORUM DISEASE IN INCUBATORS. Hubert Bunyea and Walter J. Hall. Jour. Agr. Res., xl (1930), 3, p. 209.

Pullorum disease infection was transmitted from diseased chicks to healthy chicks by exposure in an incubator for 18 to 24 hours from time of hatching without actual contact between the chicks. A large percentage of chicks so exposed succumbed to the disease even under the most favorable subsequent brooding conditions. There appeared to be a seasonal variation in the death rate due to this disease, the losses being greatest during the height of the laying season. Hatchability of eggs in incubators was higher than under hens, but livability of hen-hatched chicks surpassed that of incubator chicks. The transmission of pullorum disease among incubator-hatched chicks was about the same as among hen-hatched chicks.



Roof garden on one of the large modern dog and cat hospitals in Los Angeles.

PUBLICATIONS RECEIVED

The Toxic Constituent of Rayless Goldenrod. James Fitton Couch. Reprint from *Jour. Agr. Res.*, xxxx (1930), 7, pp. 649-658.

Tick Fever. John R. Mohler. (Farmer's Bul. 1625. U. S. Dept. Agr., Washington, D. C., 1930.) Illustrated. pp. 29.

The Cattle Tick Question. (Dept. Agr., New South Wales, Sydney, 1930.) pp. 24.

Diseases of Animals Communicable to Man. A Review. Tom Hare. Reprint from *The Medical Annual* (1930), pp. 8.

Effect of Pullorum Disease on Distribution of First Year Egg Production. V. S. Asmundson and Jacob Biely. Reprint from *Scientific Agr.*, x (1930), 8, pp. 497-507.

Porcupine Control in the Western States. Ira N. Gabrielson and E. E. Horn. (Leaflet 60 U. S. Dept. Agr., Washington, D. C., May, 1930.) Illustrated. pp. 8.

Iowa State College of Agriculture and Mechanic Arts Official Publication. Announcement, Division of Veterinary Medicine, 1930-1931. Ames, Iowa, May 14, 1930. pp. 64.

The Potency of Blood Serum of Mares in Progressive States of Pregnancy in Effecting the Sexual Maturity of the Immature Rat. H. H. Cole and G. H. Hart. Reprint from *Amer. Jour. Physiol.*, xciii (1930), 1, pp. 57-68.

Ontario Veterinary College, Session 1930-1931, Calendar of the. Guelph, Ont. pp. 48.

Virginia Ladies Meet at Staunton

The Women's Auxiliary to the Virginia State Veterinary Medical Association held its second annual meeting in the Stonewall Jackson Hotel, Staunton, July 10-11, 1930. This organization was formed in 1929 with a membership of 37. The membership was increased at this meeting to 41. Among the guests attending the sessions were Mrs. S. E. Hershey, Peter Crew and Mrs. H. M. Newton, of Charleston, W. Va.; Mrs. W. F. Guard, of Columbus, Ohio; and Mrs. Kivlighan, of Staunton. The Hostess Committee consisted of Mrs. S. C. Neff, Mrs. H. R. Clemmer and Mrs. H. E. Berry, of Staunton.

On Thursday afternoon a tour was made of the city and nearby historical points. Thursday evening a banquet for the Association and the Auxiliary was held at the Stonewall Jackson Hotel. On Friday a luncheon of fifty covers was served in the spacious log club house in Crafton's Park. Music for this occasion was furnished by Mrs. J. P. McDonough, soprano, of Richmond, with Mrs. J. T. Wilson, of Hampton, at the piano. Officers elected for the ensuing year are: President, Mrs. G. C. Faville, Hampton, vice-president, Mrs. R. M. Graves, of Culpepper; secretary, Mrs. B. B. Glover, Lexington; treasurer, Mrs. H. R. Clemmer, Staunton.

ARMY VETERINARY SERVICE

Regular Army

Captain Raymond Randall is relieved from duty at Fort Sam Houston, Texas, and assigned to duty at the Army Veterinary School, Army Medical Center, Washington, D. C., for the purpose of pursuing a course of instruction, effective on or about August 25, 1930.

The resignation by First Lieutenant Lewis Ellis Schweizer, of his commission as an officer of the Army, is accepted, effective June 3, 1930.

Major Ralph M. Buffington, now at Walter Reed General Hospital, has been directed to report to the president of an Army retiring board at Washington, D. C., for examination.

Orders relieving Colonel Eugene J. Cramer from duty at Fort Bliss, Texas, and assigning him to duty at Boston, Mass., revoked.

Orders relieving Colonel John A. McKinnon from duty at the Presidio of San Francisco, Calif., and assigning him to duty at Fort Bliss, Texas, revoked. Colonel McKinnon is assigned to duty at Fort Riley, Kansas, effective on or about July 5, 1930.

Captain Frank C. Herschberger is relieved from duty at Fort Riley, Kansas, effective September 5, 1930, and assigned to the Cavalry School, Fort Riley, Kansas, for duty for the purpose of pursuing a course of instruction in the 1930-1931 troop officers' course.

Captain Oscar C. Schwalm is relieved from duty at the New York General Depot, and assigned to duty at Fort Bliss, Texas, effective at such time as will enable him to sail on transport scheduled to leave New York for San Francisco on or about August 21, 1930.

First Lieutenant Herbert M. Cox is relieved from further duty at Fort Des Moines, effective on or about July 5, 1930, and assigned to duty at Plattsburg Barracks, New York.

Captain Howard M. Savage is relieved from duty at Plattsburg Barracks, New York, effective on or about June 25, 1930, and assigned to duty at the New York General Depot, Brooklyn, New York.

Captain Philip H. Riedel is relieved from duty at Fort Jay, New York, and assigned to duty at the San Francisco general depot, Fort Mason, Calif., effective at such time as will enable him to sail on transport scheduled to leave New York for San Francisco on or about August 21, 1930.

Captain Robert P. McComb, now on leave of absence in Washington, D. C., is relieved from duty at Fort Bliss, Texas, and assigned to duty at the Army Veterinary School, Army Medical Center, for the purpose of pursuing a course of instruction.

Veterinary Reserve Corps

New Acceptances

Steibing, Clarence Christian 1st Lieut. 421 Rosecroft Terrace, Baltimore, Md.
Keller, Frank Michael.....Captain..1614 John St., Baltimore, Md.

Promotions

To

DeCamp, Clayton Earl.....1st Lieut. 50 Orton Place, Buffalo, N. Y.
Burk, James Arthur.....Major....105 S. Earl St., Shippensburg, Pa.

Lillyman, Frank Guard....Major....Binghamton City Hosp., Binghamton, N. Y.
Young, Wesley Andrew....Captain..238 Pine St., Dedham, Mass.
Gaskill, Ray.....Captain..Box 427, Devils Lake, N. D.
Telford, Roswel A.....1st Lieut..914 Reber Ave., Waterloo, Iowa

Each of the following-named officers of the Veterinary Reserve Corps is ordered to active duty, effective July 6, 1930, for a course of training at the Medical Field Service School at Carlisle Barracks, Pa.:

Lt. Col. Henry Dunbar Martien.....4054 Powelton Ave., Philadelphia, Pa.
Major Ralph Bemus McCord.....14 Grant St., North East, Pa.
Capt. Henry Augustine Jasme.....Jacksonville, Fla.
Capt. Paul Cox Kucher.....829 W. Jefferson St., Fort Wayne, Ind.
1st Lieut. John Warden Burke.....Division of Health, U. B. Annex, Dayton, O.
2nd Lieut. Charles Cornelius Rife.....420 Edgewood Ave. N. E., Atlanta, Ga.

New Building for Army Veterinary School

Toward the close of the past session of Congress, a bill was passed making immediately available a sum of $840,000.00 for a new building at the Army Medical Center, to house the Army Veterinary School, the Army Dental School and the Army School of Nursing. This building will be a duplicate of the present Army Medical School building and will be joined to the same by an administration building which will house the headquarters of the Center. Thus there will be one big building with two wings, the Army Medical School in one wing and the Veterinary School, Dental School and School of Nursing in the other, while the administrative activities of the Center will be carried out in the central portion.

New Testing Record Set

In May the campaign for systematic eradication of bovine tuberculosis from the United States reached its highest rate of progress in the thirteen years it has been under way. In that month, 1,317,469 cattle were tuberculin-tested by federal, state and county veterinarians working cooperatively. This is about 100,000 more than the highest number tested in any previous month, according to Dr. A. E. Wight, chief of the Tuberculosis Eradication Division, U. S. Bureau of Animal Industry. These cattle were distributed among 112,973 herds or lots in practically all the states.

The largest contributions to the total of animals tested were made by New York, with 160,115 cattle; Illinois, with 130,167; Wisconsin, with 124,507; Minnesota, with 114,344; and Iowa, with 108,303. Slightly more than 1.4 per cent of the cattle tested in May reacted to the test. At the end of May, there were more than 2,000,000 cattle on the waiting list to be tested.

Doctor Bemis Succeeds Dean Klein

Dr. Louis A. Klein has resigned as Dean of the School of Veterinary Medicine at the University of Pennsylvania and has been succeeded by Dr. H. E. Bemis. Dr. Klein desired to be relieved of the duties and responsibilities of the Dean's office, so that he could give more time to his work as Professor of Veterinary Hygiene and Pharmacology. He tendered his resignation in March, to take effect June 30, with the termination of the

DR. H. E. BEMIS

University year. Dr. Bemis's appointment became effective July 1.

Dr. Klein became Acting Dean of the Veterinary School at Pennsylvania in September, 1909, on the death of Dr. Leonard Pearson, and was appointed Dean in January, 1910. He has held the position, therefore, through twenty-one sessions, but was absent on military service during the World War.

On the receipt of his resignation, the Board of Trustees of the University adopted the following resolution:

Resolved, That the resignation of Dr. Louis A. Klein as Dean of the School of Veterinary Medicine, effective June 30, 1930, be accepted with greatest regret, and that the Secretary be instructed to convey to Dr. Klein the gratitude of the Board of Medical Affairs and of the Trustees for his long, efficient, and valuable service to the University.

Dr. Bemis joined the veterinary faculty at the University of Pennsylvania in 1927, as Professor of Veterinary Surgery and Obstetrics, taking the chair left vacant by the death of Dr. John W. Adams. Prior to going to Pennsylvania, Dr. Bemis filled the same position at Iowa State College, where he was also Vice-Dean of the Veterinary Division. (See the JOURNAL, June, 1929, page 398.)

Mississippi Released From Tick Quarantine

An order signed by the Secretary of Agriculture has released the last of the Mississippi counties remaining under quarantine because of the cattle fever tick. This order, which is officially designated as Amendment 1 to B. A. I. Order 321, was dated June 11, and became effective on July 1, 1930.

Owners of live stock in this large area of south Mississippi, which includes seventeen counties, may now enjoy the same opportunity to develop their beef and dairy industries that prevails in other sections of the State, where tick eradication was achieved several years ago and where remarkable improvement along these lines has already occurred.

Purebred cattle, with which to grade up the native stock, may now be introduced safely and stock-owners may ship cattle from this area to any market without the troublesome inspection and dipping requirement which is a necessary precaution in moving cattle from the quarantined area.

The final clean-up in Mississippi was made possible by a special tick eradication appropriation of $500,000. When this fund became available, early in 1923, 23 south Mississippi counties, or approximately one-fourth of the State, were tick-infested and in quarantine. State officials and inspectors of the U. S. Bureau of Animal Industry formulated eradication plans, with a view to cleaning up this territory in two years. The program was put in operation early in 1928, and the federal authorities say that it is gratifying to all concerned that, notwithstanding numerous physical obstacles and some opposition in scattered localities, the splendid cooperation given by the majority of the stock-owners has made possible the completion of this work in schedule ime.

To protect Mississippi from reinfestation by stray, ticky cattle from Louisiana, where this dangerous pest is not under control, the Mississippi Legislature has provided for the construction of a quarantine fence along the state line. The quarantine will be rigidly enforced.

Mississippi is the eleventh state of the original fifteen tick-infested states to gain freedom from quarantine restrictions through a systematic program of tick eradication. The other states that have been wholly relieved of the tick embargo are Alabama, California, Georgia, Kentucky, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee and Virginia.

Monkey Farm at Los Angeles

Lion-killers, or Hamadryas, from Africa, are the most ferocious of monkeys. They resemble huge, gray Chow dogs and howl very much like their canine brothers. These monkeys are called lion-killers, as they are deadly enemies of the lion. Traveling four and

Lion-killers, or Hamadryas.

five hundred in a pack, their females in the center and their leader four hundred yards ahead, these lion-killers will attack the king of beasts. This is just one of the many species of monkeys to be seen at the monkey farm at Venice pier, Los Angeles. Convention visitors may enjoy visiting this farm, which is an attraction not only from an amusement standpoint but in an educational way.

Cow's Contribution to Civilization

Among the many interesting exhibits which will be shown to the Los Angeles convention visitors is one well-named, "The Cow's Contribution to Civilization."

This educational exhibit, kindly loaned from the collection of the Ideal Certified Dairy, is not only a vivid record of the cow's contribution to the civilization of past ages, but it also contains an astounding array of products which enter into the everyday life of modern man. Hundreds of different objects, many of which ordinarily are little thought to hold any indebtedness to the cow, make a fascinating and highly educational display.

Exhibit of cow's contribution to civilization.

Many of us who have habitually looked upon the cow as merely a producer of milk, butter, cheese, meat and professional calls, will be surprised to learn the vital part she plays in the production of a host of objects, from jewelry and toys to motion-picture film and musical instruments.

The California Alligator Farm

Among other places of interest to veterinarians visiting Los Angeles is the California Alligator Farm, said to be the oldest and largest commercial alligator farm in the United States. Primarily established to supply live specimens for shows, parks, zoological gardens, and the production of hides, sheer human interest in the oddities of these strange reptilians soon made the farm a singularly attractive sight-seeing place.

The farm consists of about twenty-five lakes or artificial lagoons, with a total of some 2,000 live alligators of all ages. Because of their cannibalistic and fighting nature, they are segregated according to size. In a single pool, over 350 alligators of one size enjoy the equal rights of civilization.

Dinner time among the alligators is a time of absorbing interest. Large pieces of meat thrown into the enclosure are quickly seized by the alligators. The reptiles now begin to turn over and over, in this manner twisting off generous portions which are swallowed whole. This proves that the first studies in torsional stress were made by genus Alligator long before man designed veterinary instruments. No food is eaten by alligators during the winter months, but with the approach of warm weather they begin eating

Just young alligators.

lightly; in hot weather eating ravenously. Adults may consume 65 pounds of meat at one feeding.

During the hibernation period, every tooth is shed. As a complete new set develops before summer begins, yearly visits to the dentist are obviated. Giddy young alligators just hatched "paddle their own canoes" in one pool, while in another, nearby, veterans of 200 years discuss the decadence of the times and the high price of meat.

Competent guides explain the life and habits of these strange creatures seen "at home" in the California Alligator Farm.

Runnymede Poultry Plant

Started in July, 1927, with 500 hens, the plant now covers more than 100 acres.

Capacity, 500,000 laying hens, with approximately 400,000 housed at present. Receives 25,000 baby chicks per week. Production approximately 40,000,000 eggs per year.

Type of house is lath on three sides with concrete floors covered with litter. Roosts are in the middle and raised from the floor with dropping-boards protected against hens getting on them. Birds have use of entire floor space, which is 24x24 feet. Feed-hoppers are elevated and placed at one side of the house; the nests are elevated and on the opposite side. Automatic drinking-

Airplane view of the Runnymede poultry plant.

fountains are outside of the house. The birds drink by putting their heads between the lath.

Approximately 1,500,000 pounds of all-in-one mash are used per month, which the company mixes. All birds are fed the same mash, which produces a uniform quality of eggs, both in shell texture and content, and a remarkably uniform color of yolk. All eggs are infertile.

Young's Market Company, distributor of the entire output, makes egg collections from the plant daily. A demand has been created for fresh Runnymede eggs which far exceeds the supply.

For the month of April, Runnymede received $4,500 for chicken manure.

The Los Angeles Limited, carrying the A. V. M. A. special cars, leaves the C. & N. W. Railway Terminal, Chicago, Thursday evening, August 21, at 8:10 p. m.

COMMENCEMENTS

UNIVERSITÉ de MONTRÉAL

Written examinations for both the bachelor's and doctor's degree in veterinary medicine were held at l'École Vétérináire de la Province de Québec, Université de Montréal, May 22, 1930, under the chairmanship of Dr. Damase Généreux, president of the School. The Board of Governors of the Veterinary Medical Association was represented by two members, Dr. A. A. Etienne and Dr. F. T. Daubigny. The federal government had as its delegate Dr. M. C. Baker, while Dr. J. E. Bédard represented the provincial government.

Two candidates for the doctor's degree were successful: Viateur Meilleur and Lionel Archambault. Dr. Meilleur passed with honors, also winning the Lieutenant Governor's silver medal. Mr. Gaston Rodrique obtained the bachelor's degree, at the conclusion of the second year of study.

UNIVERSITY OF GEORGIA

Dr. Edward Russell VanDeGrift, Jr., was the only candidate for the degree in veterinary medicine at the commencement exercises of the State College of Agriculture and Mechanical Arts, University of Georgia, June 18, 1930.

Frank Loyd Chastain expects to complete the work for his degree during the summer school session.

MICHIGAN STATE COLLEGE

At the commencement exercises of the Michigan State College held on June 23, 1930, the following graduates in the Division of Veterinary Science received the degree of Doctor of Veterinary Medicine.

George Bowler
Charles S. Gibbs
Cass Kershaw
George Phalares
Floyd Young
Alvah Zwickey

Since the 1929 commencement, the degree of Doctor of Veterinary Medicine was conferred upon George Willian Andree and Shu-pei Shu. Connor D. Smith has completed the work required for his degree and will receive the same upon completion of the summer Military Camp.

The prize offered by the Michigan State Veterinary Medical Association for the highest senior scholastic standing was awarded to Cass Kershaw.

A. AND M. COLLEGE OF TEXAS

Dr. W. T. Hardy, of Big Springs, Texas, was the only graduate in veterinary medicine at the 1930 commencement exercises of the A. and M. College of Texas, in June. He has accepted a position at the Sonora Experiment Station.

Advanced Degrees at University of Toronto

Dr. C. D. McGilvray, principal of the Ontario Veterinary College, directs attention to the advanced degrees in veterinary science offered by the University of Toronto, with which the College is affiliated.

The advanced degree of Master of Veterinary Science (M. V. Sc.) may be obtained by candidates who have the degree of Bachelor of Veterinary Science (B. V. Sc.) or its equivalent, upon completion of two academic years in advanced study and research, one year of which must be spent at the University of Toronto.

The advanced degree of Doctor of Veterinary Science (D. V. Sc.) will be conferred as a mark of proficiency in original investigation or of professional eminence, not less than three years after graduation. The candidate must prepare and submit a thesis, on terms outlined by the University, for either degree.

Cash Prizes for Best Letters

The Corn States Serum Company, of Omaha, Nebraska, has been conducting a letter-writing contest among farmers, which came to a close August 1. Twenty-two cash prizes were offered to hog-raisers for the best letters. Any hog-owner who had his 1930 crop of pigs vaccinated by a graduate licensed veterinarian was eligible to participate. Letters were to be written on the subject, "The Most Profitable Things to Do in Raising Pigs from Birth to 12 Weeks of Age." The prizes are in the form of cash equivalent to the amount paid the veterinarian for vaccinating the herd, regardless of the number of pigs in the herd—1 or 500 or more. Dr. C. J. Scott, secretary of the Iowa Veterinary Medical Association, will act as one of the judges of the contest.

DELAWARE STATE VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Delaware State Veterinary Medical Association was held in the Supreme Court Room of the State House, at Dover, on January 29, 1930. From the standpoint of interest and attendance this was the most successful meeting ever held. Over thirty members and guests were present.

President F. P. Ruhl, after a brief address of welcome, introduced each speaker in turn. "Epidural Anesthesia" was the subject presented by Dr. M. L. Zurkow, of Dover. This paper provoked a lengthy and spirited discussion.

Mr. J. R. Danks, of Winterthur Farms, Winterthur, discussed the question of "Breeding Problems Encountered in a Blood-Tested Herd." Mr. Danks, who has had a long and highly intensive experience in breeding high-producing cattle, presented his subject in a very comprehensive way. He expressed appreciation for the manner in which the profession has solved several major problems, but also pointed out that problems of apparently minor importance constitute in the aggregate a serious menace to the breeder. A rising vote of thanks was accorded Mr. Danks.

Dr. C. C. Palmer, of Newark, gave a very complete presentation of the subject "Abortion." The speaker touched upon the history of the disease from ancient times down to the present, the tremendous amount of work done upon it, its economic importance, relation to disease in man and suggestions for control. Dr. Palmer's paper was printed in full in one of the daily papers.

Dr. B. M. Lyon, of the Lederle Laboratories, Pearl River, New York, rendered the Association a great service in his exposition of the subject, "Canine Distemper." Judging from the number of questions and the discussion which followed Dr. Lyon's paper, it is evident that this subject is an exceedingly important one.

"The Influence the Practicing Veterinarian has in the Dairy Industry" was the subject dealt with by Dr. V. C. Moyer, of the Supplee-Wills-Jones Company, of Philadelphia, Pa. Dr. Moyer commended the profession for the vast strides made in securing the confidence of the milk-producer. The speaker emphasized the importance of cooperation between veterinarians and the various agencies that have to do with securing high-class dairy products.

Dr. E. B. Simonds, Baltimore, Md., B. A. I. inspector in charge of tuberculosis eradication, gave a summary of the work done thus far, and an outline of future plans. Dr. Simonds stated that in the successful conduct of this work in Delaware he has had the complete cooperation of the practicing veterinarians of the State.

New members admitted to the Association were Dr. George E. Loker, of Seaford, and Dr. W. L. Parrott, of Dover.

New officers were elected as follows: Dr. Louis Levinson, Middletown, president, and Dr. R. M. Sarde, Camden, secretary.

J. R. PORTEUS, *Secretary.*

MICHIGAN DIVISION, NATIONAL ASSOCIATION OF B. A. I. VETERINARIANS

At the annual meeting of the Michigan Division of the National Association of B. A. I. Veterinarians, held at Detroit, Mich., May 6, 1930, the following officers were elected to serve for the 1930-31 term: President, Dr. David Marks; vice-president, Dr. H. T. Grossman; secretary-treasurer, Dr. J. E. Zeltzer.

A number of important changes in the Constitution and By-laws of the local organization were adopted.

The Program Committee has been hard at work in an effort to arrange a worthwhile program for the meetings to be held during the ensuing year, with the result that several outside speakers have been obtained. This was made possible through the hearty cooperation of Dr. Ward Giltner, of Michigan State College.

At a special meeting of the Association, held June 3, 1930, Dr. M. W. Emmel, poultry specialist of Michigan State College, East Lansing, gave a very interesting and instructive talk on poultry diseases. A spirited discussion followed in which almost everyone present participated.

DAVID MARKS, *President.*

EASTERN STATES CONFERENCE OF LABORATORY WORKERS IN PULLORUM DISEASE CONTROL

The third annual conference of laboratory workers in pullorum disease control was held in the Laboratories of the Pennsylvania Bureau of Animal Industry, Harrisburg, Pa., May 7-8-9, 1930.

Since its inception and first meeting at Amherst, Massachusetts, in April, 1928, the primary motive of this conference has been to study the problems incident to pullorum disease control in a cooperative way. While special attention has been directed toward a comparative study of laboratory technic, with the hope of ultimately adopting a standard procedure in this regard, certain definite recommendations for the control of pullorum disease have been made on the basis of experimental data. Encouraged by the results obtained at the 1928 conference, attended by representatives of five laboratories from as many New England states, the membership was increased in 1929, and again in 1930, until the present membership includes representatives from fourteen northeastern states and three laboratories in the Dominion of Canada.

The interest of members in the activities of the conference may be judged by the attendance at the third annual meeting, when all but two laboratories (Rhode Island and Ottawa, Canada) were represented. The cooperating laboratories and their representatives follow:

Connecticut, Dr. L. F. Rettger; Delaware, Mr. H. R. Baker; Maine, Dr. F. L. Russell and Professor E. R. Hitchner; Maryland, Dr. H. M. DeVolt; Massachusetts, Drs. Henry Van Roekel and K. L. Bullis; New Hampshire, Dr. Charles A. Bottorff; New Jersey, Mr. C. B. Hudson; New York, Dr. E. L. Brunett; North Carolina, Professor R. S. Dearstyne; Ontario Agricultural College, Guelph, Canada, E. H. Garrard; Ontario Veterinary College, Guelph, Canada, Dr. J. S. Glover; Pennsylvania, Drs. R. E. Lubbehusen and D. P. Ehlers; U. S. Bureau of Animal Industry, Washington, D. C., Drs. Hubert Bunyea and W. J. Hall; University of Pennsylvania, Dr. E. L. Stubbs; Vermont, Professor L. M. Greene; Virginia, Dr. Meade Ferguson; West Virginia, Dr. J. H. Rietz. Dr. R. O. Biltz, of the Pennsylvania Bureau of Animal Industry, and Tracy M. Swem, of the State Department of Domestic Animals, Connecticut, represented their respective states as pullorum disease control officials. Visitors to the conference were Dr. J. R. Beach, University of California, and Dr. E. M. Pickens, University of Maryland.

From the beginning of its activities, the conference membership has recognized that the ultimate standardization of the agglutination test and the efficiency of this test in the control of pullorum disease has its basis in the preparation of a suitable antigen. In order to coordinate the antigen studies, a committee of five members was appointed at the time of the second annual

meeting, for the purpose of selecting *Salmonella pullorum* strains for the 1929-30 test fluid and to recommend detailed methods of preparation. As a result of the studies of the Antigen Committee, each conference member was supplied with three strains of *Salmonella pullorum* with recommendations as to proper culture media, pH and turbidity of the diluted antigen. Having had the opportunity of studying this so-called standard antigen during the 1929-30 testing season, members were asked to submit their criticism of it during the third annual meeting. The lack of

REPRESENTATIVES ATTENDING THE THIRD ANNUAL CONFERENCE OF LABORATORY WORKERS IN PULLORUM DISEASE CONTROL

Lower row (left to right): Dr. R. E. Lubbehusen, *Chairman;* Dr. D. P. Ehlers, Dr. F. L. Russell, Dr. H. Van Roekel, Dr. K. L. Bullis, Prof. R. S. Dearstyne, Mr. E. H. Garrard.
Second row: Dr. E. L. Brunett, Mr. T. M. Swem, Dr. C. A. Bottorff, Dr. R. O. Biltz, *Secretary,* Dr. J. S. Glover, Prof. E. R. Hitchner, Mr. H. R. Baker.
Third row: Prof. L. M. Greene, Dr. W. J. Hall, Dr. A. L. Brueckner, Dr. M. F. Barnes, Dr. J. H. Rietz, Dr. H. M. De Volt, Mr. C. B. Hudson
Fourth row: Dr. L. F. Rettger, Dr. Hubert Bunyea, Dr. E. M. Pickens, Dr. E. L. Stubbs, Dr. J. R. Beach, Dr. M. Ferguson.
Standing (staff members): Dr. J. D. Jones, Dr. C. W. Miller, Dr. H. W. Herriott, Dr. R. L. Elsea, Dr. A. N. Metcalf.

criticism and the uniformity of results obtained reflects credit on the work of the Committee, which will continue its studies during the coming year with the following membership: Dr. Henry Van Roekel, Chairman; Dr. L. F. Rettger, Dr. Hubert Bunyea, Dr. J. S. Glover and Professor R. P. Tittsler.

In accordance with the expressed desire of conference members, the program of the third annual meeting comprised the following: 1. A comparative study of laboratory methods.

2. An informal discussion of comparative test results, standardization methods and control problems. The laboratory activities have always been an important and interesting part of the program. The outline of laboratory work is based upon an analysis of the data obtained from the previous year and current activities. For example, last year the efficiency of the test in the hands of the various representatives was judged on the basis of comparative results obtained by the use of (1) the same type of equipment, (2) identical dilutions of serum and quantity of antigen, and (3) incubation of the same type and duration. The variable factors were: (1) test fluids used and (2) individual interpretation of results.

The laboratory program of the third annual conference was arranged to procure data on (1) the efficiency of the routine test as conducted by the various representatives, by allowing perfect freedom as to technic, and (2) the comparative efficiency of individual members in the preparation of the standard antigen in accordance with committee recommendation. The efficiency of such preparation was judged on the basis of comparative results obtained by the use of the standard antigen as prepared by the chairman of the Antigen Committee. The correlation of the agglutination test results and the bacteriologic examinations of the forty experiment birds whose sera were used serve as additional confirmation of field results, that the agglutination test can be and is being used successfully in the eradication of pullorum disease.

As at previous meetings, all discussions were informal. The afternoon of the first day was devoted to a discussion of laboratory methods, with particular emphasis on antigen studies, led by Dr. Henry Van Roekel, chairman of the Antigen Committee. Aside from a discussion of the relative merits of different methods of antigen preparation, the most important topic was with regard to the selection of proper strains of the organism. It was agreed that the selection of desirable strains of *Salmonella pullorum* for antigen preparation must be based on the correlation of the reaction obtained and the bacteriologic evidence of infection in the bird, rather than on the basis of sensitivity alone. Dr. Rettger warned against the use of too sensitive strains. It was generally agreed that the recommendations of the Poultry Committee of the United States Live Stock Sanitary Association, with regard to the diagnostic titre indicative of pullorum disease infection, should remain unchanged, until experimental evidence

is at hand (laboratory and field results) to warrant a definite change.

During the discussion on the correlation of reactions and the presence of infection, Dr. Rettger reported on a very interesting observation which he and his associates had made during the past year, wherein a certain flock, which had been clean for several years, suddenly developed severe infection in both the young chicks and the breeders. Bacteriologic examination of the birds showed them to be affected with what Dr. Rettger designates as "a new pullorum-like disease." The disease occurs in septicemic form. The causative organism, which was isolated on infusion agar only, is pleomorphic and differs from *Salmonella pullorum* in certain important respects, though on the whole there is considerable resemblance.

The use of 0.25 per cent phenolized physiological saline solution as a diluent and adjusting the pH of the diluted antigen to 8.5 has virtually eliminated the cloudy reaction according to the various reports.

Another point of interest brought out in the discussion of laboratory methods was the fact that 65 per cent of the representatives made their final interpretation of the agglutination reaction following 24 hours of incubation at 37.5° C. Others incubated the tubes 48 hours.

Since its organization, the primary object of the conference has been to assist in the control of pullorum disease, not only by perfecting and standardizing laboratory methods, but by aiding in formulating control plans based on sound experimental data. Consequently a portion of the program is devoted to a joint discussion of control problems, with regulatory officials. The discussion of control plans was led by Dr. R. O. Biltz, in charge of field work in poultry disease control in Pennsylvania. While the control plans of represented states differed in certain details, the soundness of their respective recommendations is reflected in the progress which is being made. There appears to be no question that pullorum disease can be controlled and eradicated on the basis of agglutination test results.

The following pertinent points were brought out in the discussion: Elimination of infected birds and ultimate accreditation is very much enhanced by frequent retests. Pullorum disease eradication on the basis of an annual retest is a slow and, in many instances, discouraging procedure. Control officials should concentrate in their efforts to establish accredited flocks of

representative breeds in certain areas, as a source of supply in building up clean flocks. With one exception, the requirements for accreditation were the same in all states represented, namely, that a flock (meaning all birds on the premises) shall pass two successive clean tests at not less than a six-month interval. In Maine, flocks are accredited on the basis of a single clean test. In conjunction with the discussion of control plans, Professor R. S. Dearstyne presented data on experimental studies of the intermittent reactor. These studies represented retests at fifteen-day intervals over a period of three years, the bacteriologic examinations of eggs and the influence of age and production on the reaction This work constitutes a real contribution not only from a scientific point of view but practical application as well.

The program for the third day of the meeting was concluded with a business session, at which time committee appointments were made and future conference activities were discussed. Until the committee, comprising Dr. E. L. Brunett, chairman; Drs. F. L. Russell and R. O. Biltz, selects the place of meeting for next year, all correspondence regarding the conference should be addressed to either Dr. R. E. Lubbehusen, Chairman, or Dr. R. O. Biltz, Secretary, Pennsylvania Bureau of Animal Industry, Harrisburg, Pennsylvania.

OKLAHOMA STATE VETERINARY MEDICAL ASSOCIATION

The regular semi-annual meeting of the Oklahoma State Veterinary Medical Association was held in conjunction with a short course for veterinarians at the A. & M. College, Stillwater, June 16-18, 1930. This meeting, which was well attended by veterinarians from Oklahoma and adjoining states, was certainly one of the most successful ones ever held in the history of this Association. The short course, given by the College, was pronounced a huge success by every one who was privileged to attend. Two subjects of paramount importance, *viz.*, abortion disease and parasitology, were given first place on the program.

The subject of Bang's abortion disease, its diagnosis, treatment of aborting animals, management of infected herds, and the relation this disease bears to undulant fever in man, was thoroughly covered by Dr. I. Forest Huddleson, of Michigan State College. His masterful presentation of this difficult

subject was highly appreciated by his hearers and did not fail to make a vivid impression on those who were fortunate enough to follow him through the entire course. The Association passed a resolution accepting and indorsing a plan of procedure in the control and eradication of Bang's disease in cattle as outlined by Dr. Huddleson. This plan is based on sanitation, blood-testing, and segregation or disposal of infected animals. The control measures recommended by Dr. Huddleson appealed to the members of the Association as the only ones which, in the light of our present-day knowledge, justify serious consideration.

Dr. E. A. Benbrook, of Iowa State College, gave a series of very interesting and instructive lectures on the various parasites of domestic animals, the influence which they exert on the health and nutrition of their hosts, as well as the prevention and treatment of parasitic infestations. Dr. Benbrook demonstrated that he has mastered this difficult science and has the ability to instruct as few others have.

The A. & M. College authorities are deserving of a great deal of credit for bringing these two men, who are recognized leaders in their respective fields, to the veterinary profession of Oklahoma. The unanimous expression of the Association is that a veterinary short course, similar to the one just closed, should be made a permanent annual institution and steps to this end are under way.

Other features of the short course were lectures on "The Common Diseases of Poultry," explained and illustrated by means of autopsies on numerous birds. This feature was in charge of Dr. H. W. Orr, assisted by Dr. Lewis H. Moe, both of the A. & M. College staff. Dr. H. W. Ayers, of Oklahoma City, who conducted the small-animal clinic, performed several interesting operations, including that of devocalization of a goat.

Among other questions which were disposed of during several executive sessions of the Association was the question of omitting the word "State" from the name of the Association. This was voted on and adopted. Henceforth, the official name of this organization will be "The Oklahoma Veterinary Medical Association."

C. H. Fauks, *Secretary.*

VERMONT VETERINARY MEDICAL ASSOCIATION

The twenty-second annual meeting of the Vermont Veterinary Medical Association was held at the Waterbury Inn, Waterbury,

June 17-18, 1930. The meeting was called to order by President K. M. Kennedy, with about thirty members present.

At the business session officers for the following year were elected as follows: President, Dr. W. C. Pulsifer, Woodstock; first vice-president, Dr. William Hamilton, Danville; second vice-president, Dr. L. D. Perry, St. Albans; secretary-treasurer, Dr. G. N. Welch, Northfield.

After the business session, Dr. Kennedy delivered his presidential address. Commissioner of Agriculture E. H. Jones, of Montpelier, welcomed the members of the Association and their visitors and then gave a short review of the work of the Department of Agriculture during the past year.

Dr. B. Scott Fritz, of the Pennsylvania Bureau of Animal Industry, Harrisburg, Pa., gave a very interesting and instructive talk on "Abortion Disease and Its Method of Control in Pennsylvania." Dr. Fritz has charge of seventeen large herds owned by the Commonwealth of Pennsylvania. Following his talk there was a very lengthy and interesting discussion in which most of the members participated.

Dr. L. H. Adams, of Montpelier, gave a talk on "Hemorrhagic Septicemia." He referred especially to that form of the disease known as "shipping fever" and its prevention. Dr. W. C. Pulsifer, of Woodstock, spoke on "Comparison of the Veterinary Branch of the United States Army at the Time of the World War and Today."

The members of the Association then visited the Vermont State Hospital barns where a herd of pure-bred Holsteins is maintained. At 6:15 the members and their ladies gathered in the spacious dining-room of the Waterbury Inn where an eight-course banquet was served. Following the banquet, Katherine Lebaron Luce gave a most interesting program of readings which delighted her listeners. Many of her readings were accompanied with music rendered by Mrs. Annie Morrill Carpenter. Dr. Kennedy acted as toastmaster and called on many of the members and guests for short talks and stories.

The following morning the members gathered at Dr. Kennedy's new veterinary hospital, where an all-day clinic was held. This was one of the most enjoyable meetings in the history of the Association, and Dr. and Mrs. Kennedy were the recipients of much praise from the members and their ladies.

G. N. WELCH, *Secretary-Treasurer.*

NORTH CAROLINA STATE VETERINARY MEDICAL ASSOCIATION AND SOUTH CAROLINA ASSOCIATION OF VETERINARIANS

Veterinarians of North and South Carolina came together at Charlotte, N. C., which is the metropolis of the two states and very accessible for both, for a great joint meeting, June 17-18-19, 1930, with mutual profit. Over one hundred veterinarians attended with half that number of ladies accompanying their men folks. At the first session, Dr. C. A. Cary, dean of the College of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala., gave an illuminating address on "The Veterinary Profession During the Next Decade with Special Reference to the South." Dr. Cary stressed the fact that this section of the country is destined to pay more attention to live stock. He also spoke Wednesday morning on dislocation of the hip joint in the cow and discussed the roaring operation.

Dr. T. H. Ferguson, of Lake Geneva, Wis., president of the American Veterinary Medical Association, held forth at a cow clinic at the hospital of Dr. Adam Fisher for the remainder of the day. He demonstrated epidural anesthesia, the use of the emasculatome, the relief of hard milkers, removal of teat obstruction, examination for pregnancy, and the passing of the stomach-tube with the aid of a speculum.

Thursday morning a dog clinic was held at "Dogwood," the very attractive small-animal hospital of Dr. H. C. Rea. Dr. E. W. Rackley, of Charleston, S. C., demonstrated epidural anesthesia. Dr. Mack Hays, of the Alabama Polytechnic Institute, Auburn, Ala., performed an ovariectomy and discussed mange in dogs. Dr. F. P. Caughman, of Columbia, S. C., applied a cast to the front leg of a dog, using the sodium silicate method. Dr. T. H. Ferguson performed a hysterectomy on a bitch.

Thursday morning, Dr. Ashe Lockhart, of Kansas City, Mo., discussed canine distemper. Dr. O. L. Osteen, of Columbia, S. C., read a paper on poultry practice which had been prepared by Dr. R. A. Mays, of the same city. Dr. B. C. McLean, of Aiken, S. C., discussed "The Equine Foot as a Source of Lameness," and Dr. I. R. Cooper, of Allendale, S. C., gave a case report on *Filaria immitis* in a dog.

The special feature of the banquet menu Wednesday evening, which was attended by 144 men and women, was rabbit, which is beginning to attract attention as an industry in the Carolinas.

The following state veterinarians were present and all made short addresses: Dr. J. V. Knapp, Tallahassee, Fla.; Dr. J. M. Sutton, Atlanta, Ga.; Dr. C. A. Cary, Auburn, Ala.; Dr. W. K. Lewis, Columbia, S. C.; and Dr. Wm. Moore, Raleigh, N. C. Dr. H. C. Givens, Richmond, Va., also was present during the meeting. Dr. Frank E. Kitchen, of Greenville, S. C., acted as toastmaster and called on Dr. T. H. Ferguson for an address on the work of the A. V. M. A., in addition to the other speakers.

The North Carolina State Veterinary Medical Association elected officers for the ensuing year as follows: President, Dr. W. A. Hornaday, Greensboro; first vice-president, Dr. W. T. Scarborough, Raleigh; second vice-president, Dr. P. C. McLain, Gastonia; secretary-treasurer, Dr. J. Howard Brown, Rich Square. Dr. J. P. Spoon, of Burlington, and Dr. H. J. Rollins, of Rockingham, were elected to the Board of Directors.

J. Howard Brown, *Secretary-Treasurer, N. C. S. V. M. A.*

CALIFORNIA STATE VETERINARY MEDICAL ASSOCIATION

The annual meeting of the California State Veterinary Medical Association was held at the Chamber of Commerce Building, Los Angeles, June 18, 1930.

As the annual convention of the American Veterinary Medical Association will be held in Los Angeles, in August, the meeting of the State Association consisted of only a business session and election of officers for the year. The election resulted as follows: President, Dr. P. C. Guyselman, Fontana; first vice-president, Dr. L. E. Pike, Los Angeles; second vice-president, Dr. E. M. Keef, Oakland; third vice-president, Dr. R. A. Caldwell, Colusa; secretary, Dr. W. L. Curtis, Los Angeles; treasurer, Dr. D. F. Fox, Sacramento.

The chairmen of the several sub-committees of the Local Committee on Arrangements for the sixty-seventh annual convention of the A. V. M. A. reported concerning their different plans, arrangements, and so forth, in connection with entertaining the national organization.

The annual report of the Treasurer showed that the Association had a balance on hand of approximately $1800. The report of the Secretary showed that the total membership of the Association at the close of the meeting was 339.

W. L. Curtis, *Secretary.*

NECROLOGY

BENJAMIN MOTT UNDERHILL

Dr. B. M. Underhill, a member of the veterinary faculty of the University of Pennsylvania for 22 years, died in the University of Pennsylvania Hospital, July 10, 1930.

Born April 29, 1863, in Jersey City, N. J., a son of Benjamin and Sarah P. (Truman) Underhill, he was a direct descendant, in the ninth generation, of Captain John Underhill, who, arriving at Boston from England with Governor Winthrop, in 1630, was the successful commander of the Massachusetts forces against the Pequot Indians in 1637, and later located as a Quaker settler at Oyster Bay, Long Island. Captain Underhill was the subject of one of Whittier's poems.

The mother of Dr. Underhill died at her home in Media, Pa., May 19, 1929, aged 100. She was a daughter of the noted Philadelphia Quaker minister and physician, Dr. George Truman, one of the founders of Swarthmore College. In the historic scene at the White House, when a delegation of Philadelphia Quakers visited Lincoln, Dr. Truman was their leader and began the conference with a prayer that greatly impressed the Civil War President.

Dr. Underhill received his earlier education at Swarthmore College. He was graduated in veterinary medicine from the University of Pennsylvania in 1895. He joined the faculty in 1908 and at the time of his death was professor of veterinary pathology and parasitology. He was the author of "Parasites and Parasitosis of Domestic Animals."

Dr. Underhill joined the A. V. M. A. in 1901. He was a life member of the Pennsylvania State Veterinary Medical Association. He was a member of the Keystone Veterinary Medical Association and served as president, 1906-08. He was secretary of the Delaware County (Pa.) Institute of Science.

Dr. Underhill is survived by one son, one daughter and one brother. His wife (nee Georgia Cook Meyers) died June 21, 1926.

WILLIAM J. STAPPE

Dr. William J. Stappe, of New Bremen, Ohio, died at his home, May 19, 1930, following an illness of several weeks.

Born at Delphos, Ohio, in 1883, Dr. Stappe studied veterinary medicine at the Cincinnati Veterinary College. He was graduated in 1910. He also was graduated in pharmacy from Ohio Northern University, at Ada.

Dr. Stappe practiced at New Bremen continuously from 1910. He also operated an automobile sales agency. He served as village health officer for several years and later as president of the town council. He was a 32nd degree Mason and a director of the Anglaize County Automobile Club. He is survived by his widow, his father, and one daughter.

H. A. ARPKE

Dr. H. A. Arpke, of Sheboygan, Wisconsin, died at St. Nicholas Hospital, June 11, 1930, after a protracted illness.

Born in Town Herman, Sheboygan County, April 25, 1868, Dr. Arpke attended local schools and then entered the Chicago Veterinary College. He was graduated in 1891 and entered practice at Franklin, Wisconsin. Several years later he purchased the practice of Dr. John Tasche, at Sheboygan. Later he formed a partnership with Dr. L. C. Tasche, at present sheriff of Sheboygan County.

Dr. Arpke was always interested in civic affairs. He served as alderman from his ward, 1895-96. He served as sheriff, 1903-04. In 1910 he was elected superintendent of the Sheboygan County Insane Asylum, an office that he continued to hold until his death. He was a member of several fraternal orders and served in the principal offices of most of these organizations. He was a member of the Wisconsin Veterinary Medical Association.

Surviving Dr. Arpke are his widow (nee Alma Franz), two daughters and two sons, a brother and three sisters. One son, Dr. R. H. Arpke (Iowa '27), is a veterinarian. The funeral services were attended by a large number of Wisconsin veterinarians.

Local papers paid a high tribute to Dr. Arpke, as "one of Sheboygan County's most useful men."

JOHN J. MILLAR

Dr. John J. Millar, of Hollywood, Calif., died in Saint Paul, Minn., June 11, 1930. He was a graduate of the Ontario Veterinary College, class of 1888, and practiced in Sioux City, Iowa, from 1888 to 1890, when he removed to Chicago, where he was associated with the late Dr. M. H. McKillip.

GEORGE W. POTTER

Dr. George W. Potter, of Portland, Mich., died suddenly, June 29, 1930, while making a professional call. He was a graduate of the Grand Rapids Veterinary College, class of 1917, and was located in Lansing, Mich., until a few months ago. At that time he removed to Portland and established an automobile agency there, which he operated in addition to his practice. Dr. Potter was born in Paulding, Ohio, 48 years ago, and is survived by his widow and three children by a previous marriage.

Dr. Potter was a member of the Michigan State Veterinary Medical Association.

HOWARD L. GINGERY

Dr. Howard L. Gingery, of Ainsworth, Iowa, died July 3, 1930, at Iowa City, following an operation for gall-stones. While alone in his room at the hospital, he went to a window to get some fresh air, collapsed, fell through the window four stories to the ground and never regained consciousness.

Born at Haddam, Kansas, June 29, 1894, Dr. Gingery attended Pawnee City (Nebr.) High School and the Kansas State Agricultural College. He was graduated in veterinary medicine from the latter institution in 1921 and immediately went into private practice at Crawfordsville, Iowa. Here he served as mayor for two terms. Several years ago he removed to Ainsworth, which offered greater opportunity for enlarging his practice.

During the late war Dr. Gingery enlisted as a private and reached the rank of Sergeant Major. He served as an instructor at Camp Zachary Taylor, Kentucky, and later saw service overseas.

Dr. Gingery joined the A. V. M. A. in 1923. He was a member of the Iowa Veterinary Medical Association and the Eastern Iowa Veterinary Association. He was a Mason, an Elk and a member of the American Legion.

Surviving Dr. Gingery are his widow (nee Elizabeth Squires), one son, one daughter and one brother, Dr. John B. Gingery (K. S. A. C. '10), of Muscatine, Iowa.

EDWARD COOPER

Dr. Edward Cooper, of Manchester, Indiana, died suddenly, at his home, July 7, 1930. He had been in poor health for a year, but his condition had not been regarded as serious. Heart trouble was reported as the cause of death. He was in his 68th year.

Dr. Cooper was a graduate of the Indiana Veterinary College, class of 1912.

WILLIAM T. HUME

Dr. William T. Hume, of Boonville, Indiana, died a suicide, at his home, July 10, 1930. He had been in poor health for several months and his illness was further aggravated by an automobile accident in which he figured a short time before his death.

After his graduation from the Indiana Veterinary College in 1900, Dr. Hume located at Olney, Ill., where he built a veterinary hospital and established a practice which he sold later to Dr. C. E. Lucas (Chi. '09). He removed to Boonville about 1912. In recent years he had been traveling for a wholesale drug house.

Dr. Hume is survived by a daughter.

JAMES J. SUMMERFIELD

Dr. James J. Summerfield, of Santa Rosa, California, died February 12, 1930. The cause of death was cerebral hemorrhage. Born in England, October 24, 1864, Dr. Summerfield was a graduate of the Veterinary Department of the University of California, class of 1897, having been one of about three veterinarians graduated by this institution. He joined the A. V. M. A. in 1900 and was a member of the California State Veterinary Medical Association. He had no relatives in the United States.

FRED TRIPPEL

Dr. Fred Trippel, of New Baden, Ill., a registered non-graduate veterinarian, died May 11, 1930, at the age of 69 years. He was prominent in his community, being a director of the Farmers-Merchants State Bank of New Baden and a member of the Modern Woodmen of America.

A. C. DEAVER

Dr. A. C. Deaver, of Mineral Springs, Ark., died July 3, 1930, at the age of 71 years, following an attack of paralysis suffered some weeks before.

For many years following his graduation from the Indiana Veterinary College, in 1899, Dr. Deaver conducted a practice and hospital at Hot Springs, Ark., and was a prominent figure there when racing was at its height. Several years ago, on account of his failing health, he retired to his farm, where he specialized in the growing of purebred live stock. During his younger days Dr. Deaver was a member of the Royal Canadian Mounted Police.

Dr. Deaver is survived by his widow, a sister and one brother.

JAMES A. STEVENSON

Dr. James A. Stevenson, of Winnipeg, Manitoba, passed away on July 18, 1930, after a lingering illness. He was a graduate of the Ontario Veterinary College, class of 1896, and practiced for a number of years at Carman, Manitoba. He was also in the employ of the Health of Animals Branch, Canadian Department of Agriculture, at Gretna, Manitoba, and at the Union Stock Yards, Winnipeg, for more than twenty years.

Dr. Stevenson joined the A. V. M. A. in 1904. He was a member of the Veterinary Association of Manitoba and filled various offices in the organization during his membership, including the presidency for several terms. He is survived by his widow and one daughter. The funeral was under Masonic auspices.

PERSONALS

Dr. H. D. Smiley (K. S. A. C. '30) has located at Waynoka, Okla.

Dr. H. C. Graham (Ont. '14) is now located at 241 W. Maple, Mason, Mich.

Dr. W. L. Bolin (St. Jos. '18) has removed from Turtle Lake, Wis., to Barron, Wis.

Dr. Richard N. Shaw (Corn. '12), of Springfield, Mass., removed to Garland, Maine, July 15.

Dr. Arthur J. Knilans (Chi. '16), formerly of Janesville, Wis., has removed to Freeport, Ill.

Dr. Otto Stader (U. P. '18), formerly of Madison, Wis., is now located at Saint Charles, Ill.

Dr. F. E. Johnson (Chi. '12) reports a change of address to 1108 N. Walker St., Princeton, W. Va.

Dr. H. J. Stafseth (Mich. '17), of Michigan State College, was promoted to a full professorship, July 1.

Dr. W. B. Coon (Ont. '12), of Forest Grove, Oregon, is a member of the Oregon State Live Stock Sanitary Board.

Dr. E. J. Bonneville (U. S. C. V. S. '23) has resumed practice at his former location, 1601 Venice Blvd., Los Angeles.

Dr. H. Glenn Ricker (U. P. '20), formerly located at Hagerstown, Md., is now at 230 S. Church St., Waynesboro, Pa.

Dr. V. W. Knowles (K. C. V. C. '07), formerly of Hollywood, Fla., is now located at Okeechobee, Fla., as County Veterinarian.

Dr. Fred P. Calkins (Wash. '09), formerly located at Ionia, Mich., moved to Lansing, July 1. His new address is 508 N. Walnut St.

Dr. T. H. Naylor (Wash. '26) has purchased the small-animal hospital at Ventura, California, recently operated by Dr. W. E. Harrison.

Dr. Raymond H. Alexander (K. S. A. C. '30) has accepted a position with the Pennsylvania Bureau of Animal Industry, at Harrisburg, Pa.

Dr. I. D. Wilson (Iowa '14), of the Virginia Polytechnic Institute, completed work for the degree Doctor of Philosophy, at Iowa State College, recently.

Dr. D. R. Cook (San Fran. '18) has been transferred from Fresno, Calif., to Bakersfield, Calif., on meat inspection, with the California State Department of Agriculture.

Dr. Marion C. Moses (Cin. '10), who has been located at New Carlisle, Ohio, for the past twenty years, has removed to Springfield, Ohio, and opened an office at 805 W. Columbus St.

Dr. J. W. Berry (A. P. I. '23), of Pulaski, Tenn., has been appointed a member of the State Veterinary Medical Examining Board, by Governor Horton, for a term of four years.

Dr. Jas. B. Harrison (Colo. '27), formerly of Denver, Colo., is now located in Portland, Oregon, where he is associated with the Blue Cross Dog and Cat Hospital, Inc., at 600 Union North.

Dr. John R. Scott (Iowa '24), of Rapid City, S. D., has accepted an appointment in the U. S. Bureau of Animal Industry, and is now stationed in Saint Paul, Minn. Address: 312 Concord St.

Dr. Frank Bell (Wash. '30), of Preston, Wash., has accepted a position as assistant in the Veterinary Department of the Wisconsin Agricultural Experiment Station, at Madison, under Dr. F. B. Hadley (O. S. U. '07).

Dr. Robert H. Morrison (Wash. '29), of San Francisco, Calif., has removed to 8821 Woodland Park Ave., Seattle, Wash., to take over the practice of Dr. E. A. Schmoker (K. S. A. C. '17), during the absence of the latter.

Dr. E. F. Graves (K. S. A. C. '27) has resigned his position as territorial veterinarian of Alaska, to enter the field of commercial production of fur-bearing animals. Dr. Graves is located at Spokane Bridge, Wash., R. F. D. 2.

Dr. George W. Andree (Mich. '29), who has been associated with Dr. J. V. Lacroix (K. C. V. C. '06), at the North Shore Animal Hospital, in Evanston, Ill., for the past year, has located in Rensselaer, Ind., where he will engage in general practice.

Dr. Arthur L. Delez (Colo. '25), who has been at the University of Minnesota for several years, has resigned his position there to accept a position as assistant pathologist in the Department of Veterinary Science, at Purdue University, Lafayette, Ind.

Dr. Glenn R. Browne (Chi. '14), of Hoopeston, Ill., was acquitted of a "bad check" charge recently in a court case which was the outcome of a shooting affray nearly two years ago, when Dr. Browne was shot in the arm by a burglar who broke into Dr. Browne's garage.

Dr. M. F. Barnes (U. P. '11), of the Pennsylvania Bureau of Animal Industry, addressed the joint session of the Johns Hopkins Society of Hygiene and a Chapter of the Sigma Xi Fraternity at a symposium on undulant fever in March. The subject of Dr. Barnes' address was "Brucelliasis in Animals and the Progress of Control."

Dr. J. R. Porteus (N. Y. U. '18) of Smyrna, Delaware, has recovered from the injuries he received in an automobile accident on April 16. Dr. and Mrs. Porteus were driving in their car, accompanied by their six-months-old child, when an automobile driven by a hit-and-run driver hit their car, which was overturned. The occupants were left unconscious by the side of the road. Dr. Porteus received a broken nose and Mrs. Porteus sustained a skull fracture. The baby escaped uninjured. Mrs. Porteus was able to leave the hospital the latter part of June.

Remember the dates—
August 26-27-28-29

Scene in Grand Teton National Park